

A
DESCRIPTION
OF THE
HUMAN EYE,
AND ITS
ADJACENT PARTS;
TOGETHER WITH THEIR
PRINCIPAL DISEASES,
AND THE
METHODS proposed for relieving them.

By JOSEPH WARNER, F.R.S.

And Senior Surgeon to Guy's Hospital.



The SECOND EDITION, revised and corrected.

L O N D O N :

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30.6.52

T O

Dr. HENRY HINCKLEY,
Dr. ROBERT THOMLINSON,
Dr. WILLIAM SAUNDERS,
Mr. JAMES FRANCK,

A N D

Mr. WILLIAM LUCAS,
The present Physicians and Surgeons of
Guy's Hospital,

Men of approved Abilities, and acknowledged
Integrity in their Professions;

This small Treatise, the Work of his leisure
Hours, is faithfully inscribed, by

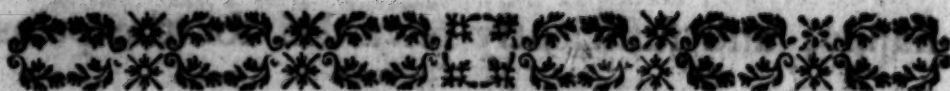
Their most obedient Servant,

And respectful Friend and Associate,

Flatton-Street.

JOSEPH WARNER.

TO
DR. HENRY WINKLEY,
DR. ROBERT THOMLINSON,
DR. WILLIAM SAUNDERS,
MR. JAMES FRANK,
AND
MR. WILLIAM LUCAS,
The Assistant Physicians and Surgeons of
Guy's Hospital,
Men of approved abilities, and acknowledged
integrity in their professions;
This small Treatise, the Work of his late
House, is respectfully inscribed, by
Their most obedient Servant,
And respectful Friend and Associate,
JOSEPH WARNER.



P R E F A C E.

THE following Treatise is intended for the information and improvement of those young gentlemen in the professions of Physic and Surgery, whose ages and employments have not yet furnished them with sufficient opportunities of acquiring such a degree of knowledge, as long experience in private practice, and the advantages of many years attendance upon an hospital, are capable of affording.

Should the small work, I now venture to introduce into public, upon a subject so interesting

teresting to mankind as that of the Eye, prove instructive to the younger Practitioners, and useful to their Patients, I shall think myself happy, and sufficiently rewarded for the pains I have been at.

From this undertaking I have no self-interested views; and therefore think it unnecessary to apologize.

The art of explaining myself upon so delicate a subject, in a concise, plain, and intelligible manner, is all I have studied. Whether or not I have effected this, the reader will be the best judge.

The whole I have written on the diseases of the Eyes, and their adjacent parts, is the result of my own experience, and repeated observations; and as such I deliver it to my readers.

To the younger part of the profession I presume to address myself in the following words

of

of Cicero, and I hope with no great impropriety:

“ Ne quid falsi dicere audeam —

“ Ne quid veri dicere non audeam.”

To the more experienced in his profession, whose curiosity may so far influence, as to induce him to peruse this Treatise, with the greatest respect, and deference due to his superior abilities, and in hopes of exciting to something more useful on this subject; to such I take the liberty of addressing myself in the expressive language of the great poet of the Augustan age:

“ ——— Si quid novisti rectius istis,

“ Candidus imperti: si non; his utere mecum.”

P. S. The chapter on the Cataract, and the two different methods recommended for the removal of this disease; together with a recital of the case of W. L. are in some measure borrowed from the Third Edition of my *Cases in Surgery*.

This, in justice to my former readers, I am conscious ought to be mentioned: but, at the same time, it may be proper, if not necessary, to inform them, that, on comparing these chapters, it will be discovered I have by no means adhered to a literal transcript; but that I have endeavoured to make some useful additions and observations on these heads.

In the Account of the Methods used for the Extraction of the Cataract, I have been much more explicit than before; to which I have added, and recommended, two instruments, to be occasionally made use of for the more safe and easy execution of this operation.

CON-



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DESCRIPTION

OF THE

HUMAN EYE.

OF THE GLOBE OF THE EYE, AND ITS
NEIGHBOURING PARTS.

THE Eyes are situated in two deep, slippery, and smooth cavities, termed Orbits. In the recent subject their smoothness and slipperiness are derived from the Periosteum; and the Membrana Adiposa; and the contents of the Membrana Adiposa.

The orbits of the eyes are of irregular dimensions.

In shape they are conical; or nearly of that form.

A great part of the fund of each orbit is open for the transmission of nerves to the eyes; and for the transmission of arteries and veins to and from the eyes, for the purposes of vision.

The orbits are placed on each side the superior and lateral parts of the nose; and are composed of the seven following bones: to wit, Os Frontis; Os Sphenoides; Os Ethmoides; Os Maxillare Superius; Os Unguis; Os Malæ; Os Palati.

The parts that are adapted to Vision are, by anatomists and surgeons, in general, treated of under two heads; and by them are distinguished, first, into those parts that are aiding and assisting in vision, but which are not concerned in forming the globe of the eye; secondly, into those parts that are employed in the texture and composition of the globe of the eye, and which are indispensably and immediately necessary to sight.

The parts that are assisting in vision are the Supercilia, or eye-brows; the Cilia, or eye-lashes; the Palpebræ, or eye-lids, together with the muscles of the Palpebræ: The Glandulæ Sebaceæ of the eye-lids; otherwise termed the Ciliary glands, or Meibomius's glands. The Puncta Ciliaria; the Caruncula Lacrymalis; the Valvula Semilunaris; the Puncta Lacrymalia; and the six muscles of the globe of the eye, together with a considerable bed of fat, in which these muscles, with the optic

optic nerve, are situated; and by which they are surrounded.

SUPERCILIA.

The situation of these parts, their composition and form, are so universally known, as renders it quite unnecessary to give any explanation on these heads. To me, indeed, it appears that the eye-brows are rather designed by nature as an ornament to the human species, than to be really of use in fight; because the anterior and inferior part of the Os Frontis, from its situation, as well as from the prominence of its form, seems to be better calculated to divert the sweat from falling upon the surface of the eye, when we use severe exercise or hard labour, and to moderate the rays of light in their passage to the eye, than the Supercilia can do; which are the two uses that are in general ascribed to these parts.—It is observable, that the eye-brows are peculiar to the human species.

CILIA.

These parts are so generally known, as to render any description of their situation, form, or texture, unnecessary; their uses are, to moderate

derate the rays of light in their passage to the Cornea; by their frequent motions they assist in diffusing the tears, and oily secretions of the sebaceous or ciliary glands of the eye-lids equally over the surface of the globe of the eye; which fluids, after having done their office of glazing the transparent Cornea, and washing away any extraneous bodies that otherwise would probably incommode the sight, are, by the assistance of the ciliary motions, combined with the farther assistance of the Caruncula Lacrymalis and Valvula Semilunaris, forwarded through the two Puncta Lacrymalia, into the Saccus Lacrymalis; and from thence through the Ductus ad Nasum into the nostril. The eye-lids likewise serve to entangle insects, that would otherwise fly into the eye, and incommode our sight to a greater degree than we find they are usually capable of doing, when we ride or walk out in the summer season.

PALPEBRÆ.

That there are two eye-lids, formed by nature to cover and defend each eye; and that they are distinguished into the upper and lower eye-lids, are facts so well known, and so generally

rally understood, as to require no commentary.

The *Palpebræ*, or eye-lids, meet together externally and internally: these points of union or contact are termed the angles or *Canthi* of the eye. The inner angle of the eye-lids, near the nose, is called *Canthus Major*; the outer angle of the eye-lids, near the temple, is called *Canthus Minor*. The eye-lids are composed of the *Cuticula*, the *Cutis*, and the *Membrana Adiposa*; their borders, or edges, are of a cartilaginous nature: which cartilages are called *Tarfi*. The shape of the eye-lids is somewhat arched; particularly the upper eye-lid. They are both lined with a thin, vascular, soft, smoothly-polished, and slippery membrane: this lining is derived from the *Tunica Conjunctiva* being reflected, after having continued its course for some space towards the posterior part of the globe of the eye. From hence we see the propriety of endeavouring at the removal of any extraneous body, that accidentally gets into the eye, by drawing the eye-lids forwards over the globe of the eye, or by passing a polished probe, or any other smooth instrument, under the upper and under eye-lid; or by injecting or dropping warm water, warm milk, or any other soft liquor, into the eye, and

under the eye-lids, with a probable view of giving speedy relief, by removing the cause of present pain and uneasiness: for by means of the Tunica Conjunctiva being thus reflected before it gets more than half way towards the fund of the orbit, the extraneous body can insinuate itself no farther than this coat reaches. The eye-lids are farther composed of fleshy fibres of considerable note, which fibres constitute three distinct and separate muscles. These muscles are known to anatomists by the following terms; Orbicularis Palpebrarum; Elevator Palpebræ superioris rectus; Depressor Palpebræ inferioris. The Orbicularis Palpebrarum surrounds the eye-lids of each eye externally, and shuts them up; it is inserted by a small tendon, near the inner angle of the eye-lids. The Elevator Palpebræ arises from the fund of the orbit near the Foramen Opticum, and is inserted by a tendinous expansion into the Tarsus of the upper eye-lid. The Depressor Palpebræ inferioris is a very thin series of fleshy fibres, arising in some subjects from the skin of the cheek; whilst in others it arises from the Os Malæ, and is inserted into the lower edge of the orbicular muscle. The first of these muscles is much larger and stronger than the other two, and counteracts both of them.

them. The second muscle lifts up the upper eye-lid, as its name expresses. The third muscle moves the lower eye-lid downwards, from whence it has its name. When the elevator muscle becomes relaxed, and incapable of action, the upper eye-lid falls down upon the globe, and occasions deformity, and in a great degree too obstructs vision. The best remedies I know of, for the relief of this complaint, are cold-bathing, astringent cataplasms applied to the part at bed-time; astringent lotions, which may be used two or three times a day, or oftener, joined with compress and bandage applied to the part in the day time, assisted by the Cortex Peruvianus, taken as a medicine; which may sometimes be joined with volatiles, and sometimes without. But, to say the truth, since we see this muscle is so deeply situated, as to be greatly out of the reach of all external applications, bandage excepted, our principal expectations must be from bandage, and such internal medicines as are above hinted at, joined with the cold-bath; and more particularly if the tone of the body be generally weakened and relaxed. The diseases to which the Palpebræ are most liable, and which frequently require the assistance of the surgeon, are tumors of different kinds; most of which, that attack

these parts, are of the encysted species. These tumors, from their situation and size, are known to prove frequently so troublesome, by their weight and pressure upon the eyes and eye-lids, as to become a deformity to the face, and to render the motion of the upper eye-lids (which I have found more frequently attacked by these swellings than the under eye lids) imperfect as to their elevation. These tumors are situated more or less deep in different people. Sometimes the basis of the tumor extends no farther than the external surface of the orbicular muscle; at other times I have found the extent of the basis of the tumor to be as deeply situated as the upper surface of the conjunctive coat, which lies beneath the inferior surface of the orbicular muscle, and the tendinous expansion of the elevator muscle of the upper eye-lid.

Sometimes the tumor is moveable by its forming a slight adhesion only to the neighbouring parts: whilst at other times, the tumor, upon enquiry, appears fixed. In the first instance, the removal of the swelling will be much more easily effected than in the latter. These tumors may properly be distinguished into four kinds; to wit, the Atheroma, the Meliceris, Steatoma, and the Anomalous Tumor;

mor; which last term is derived from the mixture and variety of contents that are found in the investing membrane which constitutes the Cyst or bag; from whence these tumors are called encysted. It ought to be remembered, that when we attempt to extirpate a tumor from the eye-lids, or from any other part of the face, that deformity should be avoided as much as possible, consistent with the perfect removal of every part of that Cyst in which the tumor is contained; but at the same time it must be remembered too, that our delicacy be not carried to such a length as to make the incision so small through the integuments, (which must be with the course of the fibres of the orbicular muscle) as to disable us from extirpating every part of the Cyst: for if we do not attend properly to this maxim, the tumor will probably grow again in a short time, so as to require a repetition of the operation; as I have sometimes known to be the case. The instruments necessary for the purpose, are a small round-edged knife, a small pair of scissors, and a dissecting hook. The instruments used on this occasion must be of the sharpest kind; as the eye-lids are, from the thinness of their make, as well as from their flaccidness, incapable of making the same resistance as any other

other parts of the face and body, when under the like treatment. This renders the operation rather more tedious and difficult of execution, than when differently circumstanced: as some degree of inflammation is to be expected to succeed this operation; and that principally, as I have almost always observed it to be, on the conjunctive coat, which, under proper management, submits in a few days to the common methods of emollient washes, emollient ointments, or cataplasms used to the part twice a day. I need, I think, say nothing more on this head, than that abstinence in diet for a few days, should be attended to; that the eye should be kept from the light; and that a little gentle physic should occasionally be administered. If such a degree of pain and heat should occur, as to make it adviseable to procure artificial rest, the saline draughts, joined with the Tinctura Thebaica, in the proportion of six or seven drops of the latter mixed with each draught, and administered every sixth or eighth hour, for one, two, or three days, I cannot but approve of, as I have now and then found such treatment of service. Bleeding I have very seldom found necessary on this occasion; but the propriety of this evacuation, as well as of every other method, must be determined upon from the degree

gree of the complaints, which greatly depend upon the constitution of the patient.

Before I finish my remarks on this disease, I must observe, relative to the operation, that a single incision made through the integuments will sometimes be found sufficient; whilst at other times, it will be found expedient to take out a bit of skin, by first making two small semicircular incisions, with their horns meeting together at each extent of the wound. It sometimes happens that children are born with their upper eyelids so formed as to extend below, and over, the Caruncula Lacrymalis; and, by joining with the under eye-lids, the internal angle of the eye is lost; the caruncle is invisible; and the Aperiens muscle is rendered incapable of performing its office. By this unnatural construction of the parts, the upper half of the globe of the eye is covered; and the subject is incapable of seeing any objects, but such as are placed below the eyes. To remedy these inconveniencies, the integuments near the nose must be divided; and the wound must be filled up with lint to prevent the reunion of the parts.

GLANDULÆ CILIARES.

Otherwise called Glandulæ Sebaceæ Meibomii, together with their orifices, termed Puncta Ciliaria,

Ciliaria, are situated in regular rows, parallel with the borders or internal edges of the Palpebræ, formed by the Tarfi. The use of the ciliary glands is to separate an oily, soft fluid: and the use of their Foramina or Puncta, is to convey this fluid, when secreted to the surface of the internal parts of the eye-lids; and to the external surfaces of the globes of the eyes. The Tarfi are thin cartilages, composing the greatest portion of the edge of each eye-lid; which, from their texture and situation, seem designed by nature to keep the edges of the eye-lids properly smooth, and uniformly extended: by this wise contrivance, the ciliary glands, with their respective orifices, or excretory ducts, are preserved at equal and proper distances from each other; and the latter are kept open, to admit of the oily fluid being discharged occasionally through them. The ciliary glands are often attacked with inflammation, enlargement, pain, and imposthumation, arising in different subjects from very different causes. Sometimes these effects are produced from common colds, and are attended with considerable inflammations of the Tunica Conjunctiva. Under these circumstances the complaint gives way to bleeding, purging, and a temporary confinement from the air and light; assisted by emolli-

ent

ent fomentations, such as warm cow's milk, or milk mixed with warm soft water, warm barley water, warm water-gruel, or warm water alone; or to the steams of either of these directed to the part, and repeated several times a day, as may be found necessary. Sometimes emollient cataplasms applied warm to the eye-lids, and occasionally repeated, joined with purging physick administered at proper intervals of time, will be found expedient. By this treatment the parts become softened, and relaxed; the ciliary Puncta are enlarged, and a discharge issues through them resembling matter; which discharge should be encouraged till the turgidness of the eye-lids is removed: then, and not before, astringent washes, and ointments, may with propriety be used to the eye-lids and conjunctive coat; or it may without risque be sometimes left to the course of nature alone; whose efforts we shall often find, in these and many other instances, to answer the purpose most effectually. But as these glands are often diseased from venereal causes, scrophulous causes, or such as are generally, though perhaps improperly, denominated scorbutic habits of body, we shall find that the simple methods alone which are above prescribed, will prove ineffectual; unless assisted by proper regimen in diet,

diet, joined with alteratives of different kinds, adapted to the nature of the disease; to wit, Mercurius Dulcis Sublimatus, Merc. Calcin. Pil. Plum. the Extractum Cicutæ, alkaline absorbents, decoctions of the woods prepared in lime water, or common water; decoctions of the Peruvian bark, prepared in the like manner as we have recommended for the woods, or the Peruvian bark in substance. Two kinds of preparations of the woods are ordered in the London Dispensatory, under the appellations of Aqua Calcis magis composita, and Aqua Calcis minus composita; the efficacy of which may be sometimes assisted by proper doses of the Vinum Antimoniale, as occasion may require; observing at all times to prevent costiveness: and, if necessary, to divert the humour from the eyes, by blisters applied to the neck, head, or betwixt the shoulders, which act not only as stimulant and evacuants, but as alteratives, by the salts of the Cantharides being copiously absorbed into the circulation, and speedily mixing with the mass of blood, by means of the absorbent or inhaling vessels of the Cutis. Issues also are sometimes adviseable, made by incision, or caustic, in one of the arms, in the neck, or behind one, or both ears.

PUNCTA LACRYMALIA.

These are two small round orifices, situated not far from the Canthus Major, or internal angle of the eye-lids, near to the extremities of the Tarsi, and almost opposite to each other: they open into two distinct canals, termed Cornua; by means of these canals, or Cornua, the tears and oily secretion of the ciliary glands are conveyed into the lacrymal sac; and from thence through the Ductus ad Nasum, into the nostril, after having first performed their proper functions upon the surface of the eye-ball.

SACCUS LACRYMALIS

is a perpendicularly oblong bag, of irregular dimensions, and of a membranous and cellular texture. It is placed in a groove, formed for its reception by the Os Unguis, and the nasal process of the Maxilla Superior, within the bony orbit. On its posterior part the Sac is joined to the Periosteum that invests the Os Unguis, and the bony canal of the superior maxillary process. On the surface of the Os Unguis, which is a very thin and brittle bone, especially in the skeleton, there are observable some small foramina; through which the Periosteum in-

finuates

sinuates itself in the form of small fibres; with which fibres are mixed some of those belonging to the posterior surface of the lacrymal sac. The use of the lacrymal sac is, to receive the superfluous tears and oily secretion of the ciliary glands; and from thence they are, in a sound and perfect state of these parts, conveyed through the Ductus ad Nasum into the nostril and upper part of the bones that form the roof of the mouth.

When either the Puncta Lacrymalia, or the Saccus Lacrymalis, or the Ductus ad Nasum, or all of them, become wholly obstructed, the tears, and the oily secretion from the Glandulæ Ciliares, cannot find their usual passage or course into the nostril and mouth: for which plain reason, these fluids must flow more or less copiously, in proportion to the quantity secreted, down the cheek on that side of the face; and thus they become troublesome to the patient, as well as unseemly to those about him.

In this manner the disease termed Epiphora, or the Watery Eye, is produced.—When the lacrymal sac itself becomes inflamed, the membranes composing this sac thicken; and if the inflammation and thickness of this sac increase to so great a degree as to fill up the passage, and the

the disease cannot be removed by proper evacuations, such as bleeding, purging, and blisters, assisted by repellent local applications, the inflammation and thickness of the sac terminate in imposthumation: in consequence of which, the sac becomes replete with matter mixed with tears and the ciliary secretions; from hence arises a distension, an elevation, and an inflammation of the integuments, as well as of the subjacent sac itself, accompanied generally with a good deal of pain. The inflammation is often continued to the neighbouring parts of the Tunica Conjunctiva and Albuginea; and from thence arises a temporary weakness of sight. Under these circumstances, matter may in many instances be discovered to regurgitate involuntarily through the Puncta Lacrymalia, and to lie upon the surface of the internal part of the globe of the eye. Upon pressing the integuments below the Puncta Lacrymalia, the matter issues freely through the Puncta. These symptoms coming on put the patient under a necessity of applying for relief, if that can be had: if not; the inflammation continues growing worse; the tumor encreases, and becomes considerably prominent; till at length the skin, and subjacent fatty membrane, being rendered incapable of admitting of any farther distension,

the cuticle first separates from the Cutis by cracking in various parts: soon after this, the Cutis and Membrana Adiposa burst: a considerable quantity of matter runs down the cheek, and continues so to do, till the sac is nearly emptied; the sore at first is large; accompanied often with irregular and ragged lips: the patient now becomes easy from the stretch of the parts being taken off: the tumor subsides; and oftentimes, through fear; through neglect; or in vain expectation of curing the wound by the efforts of nature alone; the external sore becomes contracted. It now is changed to a circular orifice attended in general with callous edges; which circumstances and symptoms, joined with the depth and hollowness of the parts underneath, constitute that disease, which, when situated in any part of the body whatsoever, is termed a fistula, or a fistulous ulcer; but when confined to this part, it is universally known amongst the physical faculty by the term *Fistula Lacrymalis*: which name is derived from its situation, and the parts concerned in this disease. This malady is seldom or ever curable by any other means than by operation, as is sufficiently known to the experienced surgeon. The mode of operating upon this part, must be different under different circumstances: for instance, if the lacrymal

lacrimal sac and its integuments be distended with only a small degree of inflammation, and thinness of the skin, a single incision made with a small sharp round-pointed knife, and carried from the upper to the lower extent of the tumor quite down into the cavity of the cyst, will sometimes be found sufficient, for the future purposes of applying proper dressings to the bottom of the diseased sac. Where the skin is much lifted up, and is grown thin, and discoloured from a large quantity of matter that has long been deposited and confined in the sac; or where the integuments have burst, and are become callous; and the natural colour of them is altered to a mixture of paleness and lividness; it will be found expedient in the first instance to remove an oval piece of the integuments and sac, by making the incisions equally long with the distended skin, and of such a breadth, as will admit of a removal of the greatest part of the diseased integuments and sac. By these means, we shall have all the advantages of the proper treatment of an hollow ill-conditioned sore, that can be obtained by art.

In the second instance, the whole of the callous integuments, together with the upper part of the lacrimal sac, must be cut away at the time of operating, to afford us those advantages

which have already been mentioned; and which may be done without occasioning future deformity, as experience proves.

The last thing, in this operation, to be considered is, to judge of the expediency of perforating the Os Unguis. By some it is advised, that this process of the operation should not be put in execution, when the Os Unguis does not appear to be carious: the true characteristic of which is its being divested of its Periosteum. But I must dissent from this opinion, since I have several times learnt from experience, that there is no curing a disease of this kind, without destroying the Os Unguis, at least in part, even when that bone is not denuded and carious. I have cured fistulas of this kind by once operating upon the Os Unguis in this manner; which fistulas have for several years eluded the efforts of repeated incisions alone, made in an unexceptionable manner, joined with the most judicious dressings for the purpose. I once had a young lady under my management, for a Fistula Lacrymalis of seven years standing; the cure of which had been attempted by three or four different operations, that were performed without breaking through the Os Unguis. The wounds, as she informed me, had healed outwardly several times, but did not long continue well.

I made incisions through the integuments in two opposite directions, and so shaped as to admit of my taking away a small oval bit of skin; and I afterwards perforated the Os Unguis, and kept the wound open for some time: she did well at the end of six weeks, and has had no return of her complaint, though twelve or fourteen years are elapsed since she was under my care. The necessity of breaking through the Os Unguis arises from the diseased state of the hind part of the sac and Periosteum; which, so long as both of them, or the Periosteum alone, continues thickened, will not admit of a good and firm bottom being procured by any other degree of art that I know of. After a perforation is made through the Os Unguis, it is my custom immediately to introduce a small long sponge tent through the wound into the nostril; and I continue the use of the tent for ten or twelve days, or longer, as I see necessary. I always use thin and soft injections, to wash away the discharge, and to keep the parts clean and open quite into the nostril, whenever I dress the wound, which is generally at first necessary to be done twice a day. When the opening through the Os Unguis appears sufficiently confirmed; which I judge it to be, by my being able to introduce into the nostril a small bougie, or

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The last thing, in this operation, to be considered is, to judge of the expediency of perforating the Os Unguis. By some it is advised, that this process of the operation should not be put in execution, when the Os Unguis does not appear to be carious: the true characteristic of which is its being divested of its Periosteum. But I must dissent from this opinion, since I have several times learnt from experience, that there is no curing a disease of this kind, without destroying the Os Unguis, at least in part, even when that bone is not denuded and carious. I have cured fistulas of this kind by once operating upon the Os Unguis in this manner; which fistulas have for several years eluded the efforts of repeated incisions alone, made in an unexceptionable manner, joined with the most judicious dressings for the purpose. I once had a young lady under my management, for a *Fistula Lacrymalis* of seven years standing; the cure of which had been attempted by three or four different operations, that were performed without breaking through the Os Unguis. The wounds, as she informed me, had healed outwardly several times, but did not long continue well.

I made incisions through the integuments in two opposite directions, and so shaped as to admit of my taking away a small oval bit of skin; and I afterwards perforated the Os Unguis, and kept the wound open for some time: she did well at the end of six weeks, and has had no return of her complaint, though twelve or fourteen years are elapsed since she was under my care. The necessity of breaking through the Os Unguis arises from the diseased state of the hind part of the sac and Periosteum; which, so long as both of them, or the Periosteum alone, continues thickened, will not admit of a good and firm bottom being procured by any other degree of art that I know of. After a perforation is made through the Os Unguis, it is my custom immediately to introduce a small long sponge tent through the wound into the nostril; and I continue the use of the tent for ten or twelve days, or longer, as I see necessary. I always use thin and soft injections, to wash away the discharge, and to keep the parts clean and open quite into the nostril, whenever I dress the wound, which is generally at first necessary to be done twice a day. When the opening through the Os Unguis appears sufficiently confirmed; which I judge it to be, by my being able to introduce into the nostril a small bougie, or

a large ductile probe, without meeting with any resistance; I then use soft tents of lint, for a week or ten days longer. After the tents are discontinued, I dress the wound carefully down to the bottom; sometimes with pledgits of detensive ointments, sometimes with dry lint only; observing occasionally to touch the sprouting and loose flesh with the lunar caustic, which I have almost always observed gives less pain than the vitriol, and is more effectual. This I continue to do, till I am satisfied of there being no more discharge from the wound than there ought to be from any other wound of the same size. When matters are arrived at this state, I dress the wound almost superficially with lint, or Ceratum Epuloticum spread upon lint, till the parts are healed; which, from the first of the operation, I have observed require five or six weeks, and sometimes a longer time, before the cure can be compleated: dependent upon a variety of circumstances. After the wound is healed, the tears in some will not be any longer troublesome, by their falling upon the cheek; whilst, in others, they shall continue to be so in a small degree.

The Os Unguis is so thin, as to require very little force in breaking through it. I have often made a passage through this bone into the nostril

nostril with the edge of my incision-knife, and in so effectual a manner, as not to require the assistance of any other instrument than a large probe or bougie, which I bend and adapt to the size and course of the orifice; inclining it at the same time downwards into the nostril.

When the perforation is properly made, the cracking of the Os Unguis is sometimes heard by the operator, and a discharge of blood in a small quantity trickles down the nostril. If a trocar shall be thought necessary to the perforation of the Os Unguis, the instrument should not be too much curved; which precaution will be necessary for the certain and direct conveyance of its point to the Os Unguis. If the trocar be made very curved, the point of it will be brought too much forwards and outwards, inclining to the nasal process of the superior maxillary bone, which, from its thickness and strength, will not admit of being broken through without very great force: this must always be avoided. These hints will, I am convinced, be found useful to those who are not perfectly skilled in the situation and texture of those parts, and who have not been much accustomed to this operation.

N. B. It may be remarked, that, in the treatment of this disease, I have not recommended pressure upon the integuments, and subjacent lacrymal sac, by means of an instrument, in incipient abscesses and distensions of these parts; nor have I spoken of the application of such an instrument as necessary after the operation. I have seldom, if ever, found such an application of service. On the contrary, I have often observed, that a steel instrument, however cautiously applied, sits uneasy on the tender parts, and increases the inconvenience arising from the malady, by producing pain and uneasiness. In my opinion, the best pressure that can be made, in an incipient abscess of the lacrymal sac, is, by one of the fingers occasionally used to press on the inferior part of the tumor, when the sac is loaded and distended; which pressure must occasionally be repeated with caution, so that the whole, or the major part, of the accumulated contents of the sac may be discharged through the Puncta Lacrymalia without giving pain. By this simple treatment, joined with purgative medicines, and a moderately cooling and astringent eye-water, the disease is prevented from increasing; and a perfect cure may possibly be effected: at least, the necessity of submitting

mitting to a painful operation will, for a length of time, if not wholly, be prevented. I have spoken of the use of alteratives after this and some other surgical operations; to which let me add, that a judicious treatment of the like kind, before we perform any operation of consequence, is often, if not always, adviseable in bad habits of body. In this, as well as in many other surgical diseases requiring operation, opiates occasionally administered, evacuations by bleeding, gentle purges, or glysters, and antiphlogistic medicines, joined with a proper regimen in diet, I consider as necessary points to be attended to by the surgeon, for the ease and safety of his patients. These methods ought to be continued till the inquietude, spasms, pain, and symptomatic fever, arising from the severity of this or any other operation, are removed. In many instances, it will be found necessary to have recourse to alteratives: sometimes of the mercurial kind; sometimes of the antimonial kind, given alone, or joined with such medicines as are termed antiseptics; as the Cortex Peruvianus in substance, or made into decoctions, or infusions with common water, or simple lime-water; the Aqua Calcis magis composita, the Aqua Calcis minus composita, of the London Dispensatory;

or decoctions of equal parts of saffras and
sarsaparilla.

Such remedies as these, I know, will often
be found of great benefit to the patients, and
will enable the surgeon to effect a cure, which
he would otherwise, in many cases, find him-
self unable to accomplish.

CARUNCULA LACRYMALIS.

This small eminence is improperly so named;
as it is of a glandular, and not of a fleshy
substance. It is situated in the inner angle of
the eye: it secretes an oily fluid, as the ciliary
glands do, and for the same purposes: it serves
likewise to direct the tears, in conjunction with
the Valvulae Semilunares, through the Puncta
Lacrymalia of the eye-lids. It is subject to
diseases in common with the Glandulae Sebaceae
of the eye-lids: and which require the like
treatment as the diseased sebaceous glands
do.

VALVULA SEMILUNARIS.

This is a small semilunar membrane, conti-
nued from the Tunica Conjunctiva. It is situ-
ated near the Caruncula Lacrymalis, with its
concave edge looking towards the pupil of the
eye, and its convex edge towards the nose; it
mutually assists, and is assisted by, the carun-
cle,

cle, in directing the tears to the Puncta Lachry-
malia.

GLANDULA LACRYMALIS.

This gland is of a considerable size, and of the conglomerate kind. It is placed above the globe of the eye, within the bony orbit, in a cavity of the Os Frontis, and near to the external angle of the orbit. Its use is, to secrete the tears from the blood; and, when the tears are secreted, they are conveyed from this gland by means of their respective ducts, which pass nearly parallel to each other, under and through the expanded Tunica Conjunctiva, to discharge their contents upon the surface of the eye. By this thin, watery fluid, when assisted by the oily secretion of the ciliary glands and lacrymal caruncle, the surface of the eye is kept clean, smooth, transparent, and glazed, for the purposes of distinct vision.

This gland, in common with other glandular parts, is sometimes the seat of diseases which require the aid of surgery and physic; but I know of no disease that is peculiar to it.

I have a few times seen the lacrymal gland so much enlarged, and altered from its natural texture, as at length to evade every kind of aid
but

but that of extirpation ; which, on account of its size, its hardness, and situation, has been accompanied with so great a degree of pain, deformity, and impediment to the sight, as to oblige the poor distressed patient to sue for relief from surgical operation ; which desire, under some circumstances, ought reasonably to be complied with, as I have successfully experienced. This species of swelling differs essentially from that kind of encysted tumor which is of the Meliceris, or rather of the ganglion kind, taking its rise amongst the fatty and membranous parts surrounding the bottom of the eye, in the bony socket about the optic nerve, which, by its increase, sometimes gradually pushes the whole globe of the eye outwards and forwards, and occasions blindness. It is a melancholy thing to be reflected upon, that the extirpation of the eye itself must be submitted to when this case occurs ; and, in the former instance, though the eye itself does not necessarily become the subject of the operation of extirpation, yet the whole gland being removed gives very small hopes or probability of restoring the eye to sight : especially if the disease has been so long neglected, as to cause blindness from the compression which the optic
 nerve

nerve and internal parts of the eye have for a long time sustained. — See my Cases in Surgery, p. 98. 3d edit.



OF THE MUSCLES OF THE EYE.

THE muscles of the globe of the eye are six in number, which are thus named: 1. Musculus Superior, five Attollens; 2. Inferior, five Deprimens; 3. Exterior, five Abducens; 4. Interior, five Adducens; 5. Obliquus Superior, five Trochlearis; 6. Obliquus Inferior, five Obliquus Minor. These muscles take their names from their situations and uses. They are, together with the optic nerve, surrounded by a considerable quantity of fat, which makes an easy bed for them, and for the whole globe of the eye; and by this means greatly assists the muscles of the eye, and the eye itself, in the variety of motions of which they are capable. All these muscles take their rise from the fund of the orbit, except the Obliquus Inferior; which last muscle arises near the edge of the orbit, on its inferior part. They are severally inserted, by their respective tendons, into the

Tunica

Tunica Sclerotica, but in very different parts of it. The Attollens and Abductor muscles arise from or rather near to the Foramen Lacerum, at the fund of the orbit, and are inserted into the Sclerotica by thin and expanded tendons. The Deprimens, Adducens, and Obliquus Inferior muscles arise from the edge of the Foramen Opticum of the orbit, and are likewise inserted into the sclerotic coat: the two former of these three muscles have their tendons expanded as the Attollens and Abductor have. The tendinous expansions of the Adducens, Abducens, Attollens, and Deprimens muscles, by being inserted pretty nearly opposite to each other on the anterior part of the Sclerotica, near the Cornea, constitute the Tunica Albuginea of the eye. When these muscles contract jointly, they draw the globe of the eye towards the fund of the orbit, and act as antagonists to the two oblique muscles of the eye which serve to push the globe forwards and outwards. The Obliquus Superior, five Trochlearis, after having passed through the Trochlea, where it is fixed to the Os Frontis; becomes reflected, and is inserted into the sclerotic coat behind the insertion of the Attollens muscle.—The Obliquus Inferior is inserted into the Tunica Sclerotica; between the insertion of the optic nerve, and the

the Abductor muscle of the eye.—By these different actions of the different muscles, it appears to me, that the shape of the globe of the eye is rendered more or less depressed, or more or less prominent to enable us to see with accuracy at different distances. The Adductor, and Abductor muscles are subject to affections, which in children admit of being relieved, and sometimes of being perfectly removed, by very gentle and simple methods.

When the action, or involuntary contraction of the Adductor Oculi, is so great as to exceed the powers of its antagonist, termed Abductor Oculi; the globe of the eye is then drawn downwards, and inwards: the pupil of the eye by this means, in some instances becomes almost invisible; and the sight of the eye, or eyes, thus affected, is thereby rendered imperfect.

Under these circumstances, children being incapable of viewing such objects as are situated opposite to their eyes, or above them: they gradually contract an habit of holding their heads obliquely downwards; and of turning their eyes obliquely upwards to enable them to see to advantage: which is not only attended with a considerable inconvenience to themselves; but appear disagreeably to those about them.

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This impediment may in some instances be greatly relieved; and in others perfectly removed by the assistance of those instruments called goggles; which are short conical tubes composed of ivory stained black with a thin plate of the same ivory, fixed in the tubes near their anterior extremities: through the center of each of these plates is a small circular hole, about the size of the pupil of the eye, for the transmission of the rays of light.

These goggles in the day-time must be continually worn; and their use must be persevered in, till the muscles of the eye are brought to act regularly and uniformly, so as to direct the pupil straight forwards: by which means the squinting, or distortion of the eyes, will be gradually removed: this effect will sooner or later be produced; dependent upon the degrees of infirmity of the parts themselves, as well as upon the general state of body of the patient.

If the subject should in other respects be of a tender and relaxed constitution, and there be no good reason for objecting to it; the use of cold-bathing is adviseable. Should the Abductor Oculi be preternaturally contracted, the Adductor Oculi then becomes in proportion preternaturally elongated; and the globe of the eye will be directed laterally outwards: for the relief

lief of which, the same methods must be taken, as have already been proposed.

This disease often arises from too great a delicacy, or weakness of the Retina and Optic Nerve; so that the muscular affections of the globe are often in such cases to be considered as symptoms, and not as causes of the complaint: for which obvious reason, such methods are adviseable, as are likely to give a general strength to the body of the patient; at the same time that these instruments are made use of.

OPTIC NERVES.

The Optic Nerves arise separately from those eminences of the Cerebrum, known to anatomists by the term, *Thalami Nervorum Opticorum*.

These nerves, as they pass over the Sella Sphenoidalis, near the basis of the skull, approach each other, and become united: they afterwards are separated, and proceed in distinct trunks to the Foramen Opticum of each sphenoidal bone. Through these Foramina the optic nerves pass to the funds of the globes of both eyes, and perforate the Sclerotica and Choroides, in an oblique direction, inclining towards the nose; where each nerve becomes finely expanded, and forms the Tunica Retina, after having passed

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through

through the Sclerotica and Choroides. These nerves, when totally deprived of sensibility, are accompanied with dilated pupils; an unaltered state of the transparent humors of the eye; and, in almost all instances, with an incapacity of action in the muscular fibres of the Iris; for which reason, the two natural motions of a contraction and dilatation of the pupils are lost. This disease, from the transparency of the several humors, and their membranes or coats, is termed Gutta Serena. The Gutta Serena admits of no operation on the eye itself. But, when the case is recent and partial, evacuations of blood from the temporal arteries, by leeches or the lancet; from one of the external jugular veins; or from a vein of the arm, joined with brisk purgatives, are adviseable. Blisters on the head are likewise to be recommended; or an issue made by caustic on the coronal suture, where it joins with the sagittal; provided blisters do not succeed to our wishes. It may be remembered, that a strong decoction in water, of equal parts of Peruvian bark and valerian root in powder, joined with volatile salts, administered in pretty large doses at proper intervals of time, is sometimes practised with considerable benefit to the patient. The Oleum Animale and musk are still more powerful medicines

dicines of the nervous tribe; both which, on some occasions, are known to do signal service in enervated, and even in paralytic habits of body. Sometimes cold bathing is of great service in this disorder.

N. B. In treating of this subject, I have mentioned, in common with other observers, that the Gutta Serena is attended with dilated pupils; which in general is most certainly the case; but it really is not always so. I have seen a few instances of this disease, where the pupils were greatly contracted, though not so much so as to prevent my seeing distinctly through them. In the instance of a young gentleman, whom I several times visited on a similar occasion, his defect of sight was accompanied by a palsy of the lower limbs; in his eyes the pupils were contracted to at least half their natural size; the fibres of the Iris had no visible motion; the humors of the eyes preserved their natural transparency; his sight was not totally lost; but it was become so much impaired, as to be of little or no use to him; and it seemed to be affected in a degree pretty nearly equal to that of his legs and thighs. I will further add, that, though dilated pupils be almost always a symptom of the Gutta Serena, yet every dilated pupil is not a certain sign of this disease: experience and observation confirm

the contrary. Scrophulous subjects often have very dilated pupils, attended with little or no defect of sight; but in them the pupils preserve their motion; the loss of which motion is a more certain sign of a Gutta Serena than a dilatation of the pupils. These observations, however speculative they appear, may nevertheless probably lead us to some useful hints in the treatment of our patients of the scrophulous tribe, as they indicate a considerable degree of relaxation in their constitutions: which may probably be much relieved by a wholesome dry air: nourishing diet of easy digestion; moderate exercise: the use of the Cortex Peruvianus in infusions; decoctions; or in substance: and by the repeated use of cold bathing in sea-water; or fresh-water; observing at the same time, to keep the body from costiveness.

The pupils of children are observed to be nearly, if not quite, as large as the pupils of adults. I must further observe, that the symptoms attendant upon an incipient Gutta Serena, and an incipient Cataract, are often so nearly alike, as to require every degree of information in this part of anatomy, which we can obtain from observation and practice, to entitle us to judge of the case with precision; but, when these diseases are confirmed, or even far advanced,

ced, the difference between them is more easily ascertained.

The Gutta Serena and Cataract sometimes attack the eye, or eyes, at one and the same time, though seldom: and they keep pace with each other, till both diseases are confirmed. Sometimes the Gutta Serena succeeds the Cataract; which unlucky circumstance is known, in some instances, to happen after the operation of couching, or extracting the opake crystalline humor. This event unavoidably frustrates the reasonable expectation of success from the operation, though it should have been performed with the greatest propriety and dexterity. Sometimes the operation is succeeded by a considerable degree of inflammation and pain; whilst, at other times, the patient happily escapes with very little of either.

Since I have remarked, that the symptoms of an incipient Gutta Serena and Cataract are sometimes a good deal alike, it might reasonably be expected that I should explain in what respects they are so.

A preceding head-ach, situated near the forehead; a dimness of sight, as if gauze was placed before the eyes; the idea of moths flying before the eyes; a single object multiplied, are circumstances and symptoms that attend both these

disorders in their rise and progress: but, when the Cataract is so far advanced as to render the Crystalline Lens incapable of converging the rays of light, we may, by looking narrowly in some subjects, discover a small spot in the center of the Lens, by means of a convex glass, if not with the naked eye; and we may, in some instances, still further discover opaque Radii extending from the center of the crystalline towards its circumference: the interspaces of which, at the same time, remain transparent; whilst, in others we may be able, and more commonly too, to discover an uniform cloudiness in the Aranea of the crystalline humor. I once had a patient, in whose eyes the Cataracts advanced so slowly, as to be full seven years before they were confirmed. In the course of my attendance upon this gentleman, he several times informed me, that, when he looked at a single candle, it appeared multiplied, and represented a dozen or more candles placed round a circle; which circumstance probably arose from these Radii being pretty nearly at equal distances from each other; whilst the different divisions of the crystalline humors preserved their original transparency, and by these means were capable of forming many distinct Foci upon different parts of the Retina. This gentleman's eyes were operated

rated upon when they became useless ; and the Cataracts were happily extracted. The operation restored him to a comfortable and useful degree of sight, when assisted by convex glasses. His sight continued for about two years ; at the end of that time a Gutta Serena gradually came on, which rendered him irrecoverably blind.



OF THE EXTERNAL COATS OF THE EYE.

THE parts which are immediately concerned in the formation of the eye, are its tunics or coats, its humors, its nerves, and its vessels of different kinds. The tunics or coats of the eye, from their different situations, may with propriety be distinguished into the external coats of the eye, and the internal coats of the eye ; by this means, we may more readily form a just idea of the composition of this wonderfully constructed organ, than we probably should otherwise be capable of doing, were they not separately treated of.

The external coats of the eye are four ; to wit, Tunica Conjunctiva ; Tunica Albuginea ; Tunica Sclerotica ; and Tunica Cornea. The Tunica

Conjunctiva, and the Tunica Albuginea, are by some anatomists termed partial coats. The Tunica Conjunctiva invests a part only of the globe of the eye; but to the internal surface of the eye-lids it gives a compleat covering; this coat likewise covers the Cornea on its external, or convex surface.

The Tunica Albuginea is placed immediately under the Tunica Conjunctiva, and is formed by the expanded tendons of the four straight muscles of the globe of the eye; this coat likewise invests only a part of the globe, from which circumstance the Albuginea and Conjunctiva are called partial coats.

The Tunica Conjunctiva is replete with vessels of the lymphatic kind; which vessels, in a natural or sound state, contain a colour less fluid; but in a state of inflammation, they are more or less filled and distended with blood; which distention produces pain; and from the rigidity they acquire in this state, when the eye-lids are put into motion, they give the patient the idea of having sand or grit in his eyes. A fever often accompanies this complaint, attended with a præternatural discharge of tears, and an incapacity of looking at the light. When the inflammation is removed, the eyes resume their natural complexion, and the strength of sight gradually

dually returns. The Tunica Conjunctiva joins the eye to the eye-lids, and is reflected upon their internal surfaces, after having invested the globe of the eye on its anterior part.

The inflammation of the Tunica Conjunctiva, which is often of a severe and obstinate kind, ought to be removed as soon as possible by blood being taken in proper quantities from the temple or temples, by leeches; or the lancet, or by drawing blood from one of the external jugular veins; or from the arm or foot, and occasionally repeating it. Cupping on the head, neck, or betwixt the shoulders is adviseable, when the patient will not submit to evacuations of this kind, by bleeding with the lancet or leeches, as we sometimes find to be the case. A loss of blood by cupping may probably be thought the most adviseable method, in some instances of this kind, on account of the languidness of the patient; but at the same time it may not be amiss to recollect, that, after bleeding at the arm, the pulse is often found to rise, and the oppressed spirits of the patient to revive, rather than sink, from this evacuation; blisters are likewise adviseable.

The loss of blood, when assisted by mercurials given in proper doses alone, or mixed with small quantities of opium, to prevent their sitting uneasy

easy on the stomach and intestines, and to prevent their passing too suddenly off by stool or vomiting, will, with the farther assistance of cooling purges administered at proper intervals, be found of the utmost consequence. The quantity of mercury, and the strength of the purges, should be proportional to the strength and age of the patient: which may be repeated every second or third night, and on the succeeding mornings, as we see necessary.—On the intermediate days, antiphlogistic medicines should be prescribed, together with a strict regimen in diet; and opiates should be occasionally given; observing to adhere strictly to methods of this or a similar kind, till there is a remission of pain, fever, and restlessness; then, and generally not before, the *Cortex Peruvianus*, in infusion, decoction, or substance, mixed with something opening, if necessary, should be given more or less frequently dependent upon symptoms and appearances; and should be continued for a longer or shorter space of time, as may be judged adviseable. During the inflamed state of the eyes, the patient should be kept in the dark, and nothing painful or stimulating should be applied to them; on the contrary, fomentations of the softest kind, such as have already been recommended, should be used two or three times

times a day, or oftener, if necessary. Soft cooling ointments, and emollient relaxing cataplasms, will, under many circumstances, be adviseable applications to the part; but the eye-lids ought not to be bandaged down for a longer time than may be found necessary for keeping on the local applications, as a confinement of those parts necessarily prevents a freedom of circulation in the minute vessels of the eye and its coverings, as well as prevents the tears and ciliary secretions from being properly secreted, and discharged.

As soon as I discover that the inflammation disappears, and sometimes before it has quite disappeared, I recommend lotions that are cooling and moderately astringent, such as are composed of a solution of *Saccharum Saturni*; or of the *Pulvis à Cerussâ comp.* or of the *Extractum Saturni*, to be used two or three times a day, and continued till the eyes resume their natural strength and colour.—Astringent ointments may sometimes be adviseable, to rub upon the internal surface of the edges of the eye-lids; but they are not often necessary; and particularly so, as eye-waters may be composed in such a manner, as fully to answer the purpose of ointments, without incurring their inconveniencies.

Children,

Children, soon after birth, as well as later in life, are sometimes observed to be very severely afflicted with general inflammations of the globes of the eyes, which extend themselves to the internal surfaces of the eye-lids, producing external tumors and elevations of the parts: these disorders are accompanied by very copious discharges of matter, attended with so great a degree of relaxation and thickness of the conjunctive coat, as perfectly closes the eye-lids, and prevents the surface of the Cornea from being inspected: I have often been consulted in cases of this kind, when, upon my attempting to lift up the upper eye-lid, or depress the lower, the parts became inverted, and discovered to me, that the linings of the eye-lids were greatly inflamed: they appeared too considerably wrinkled and thickened, resembling an inverted Intestinum Rectum; a great quantity of Pus issued from between these parts and the globe of the eye itself, so as most effectually to prevent my seeing the surface of the Cornea. This disease appears very alarming, and requires immediate assistance; which, if timely administered, has been generally successful; but when the disease is neglected, sometimes a partial, and at other times total blindness has ensued. The methods I have taken for removing this disorder, are these:

these: the eyes are thoroughly washed and cleansed several times a day, by means of a syringe and some warm diluting liquor, such as common water warmed, equal parts of warm water and cow's milk, or warm barley-water. Afterwards I apply cooling ointments upon the eye-lids, or emollient cataplasms, which should be continued till the turgidness of the parts is removed: at the same time I direct purges of rhubarb alone, or rhubarb with magnesia, to be administered, and repeated every second or third day, till the disease gives way. Sometimes I have found it necessary to apply leeches to the temples of the infant, and a blister moderately irritating to the nape of the neck, or betwixt the shoulders, which blister has been kept open for a week or ten days, or longer, as I have seen necessary. After the turgidness of the eye-lids subsides, and the inflammation of the Tunica Conjunctiva disappears, (though the discharge has in some instances still continued to flow in considerable quantities) I have given with success a light decoction of the bark, four or five times a day; now, and not properly before, lotions of the cooling and astringent kind may be applied with safety to the eyes, and repeated three or four times a day, or oftener, observing not to bind the eye-lids down; but on the contrary, to permit

mit them to have as free motion as they are inclined to take: the eyes must be kept from the day-light, fire-light, and candle-light, till they are capable of being freely opened. I am apprized, from the particular construction of the eyes of infants, that they are not so quick of sight, as when they grow older; and therefore probably may not be so soon affected by the light at that early time of life, as they afterwards are, when the Cornea changes its form to a greater degree of convexity, by an increased quantity of the aqueous humor being deposited in the chambers of the eye.

If the inflammation of the eyes be at any time of life joined with a venereal, scrophulous, or scorbutic habit of body, (which experience shews us is often the case) we must not flatter ourselves with the expectation of totally removing the disorder, and preventing its return, by the simple methods already recommended; but we must have recourse to such remedies as have been mentioned on the subject of the diseased Ciliary Glands, &c. to which passage I refer the reader for my opinion.

Experience shews us, that an inflammation of the eye, from its severity, its long duration, and its frequent returns, is often succeeded by a thickness and opacity of the Cornea; which, if
 flight,

flight, and there be no future returns of inflammation on the eye, sometimes gradually disappears without any physical regimen: sometimes it gives way to the repeated applications of equal parts of glass and white sugar-candy, reduced to very fine powder by levigation: sometimes it is curable by manual operation. But when the disease is so general as to affect the whole depth, or thickness of the Cornea, neither of these methods ought to be put in practice; nor indeed should they be thought of, in a state of inflammation; or if the Cornea be diseased at such a distance from its center as to occasion no impediment of sight.—I have once or twice been prevailed upon to endeavour at a removal of such an obstacle by manual operation, contrary to my advice and opinion; which endeavours have proved as unsuccessful as I expected them to do. In a few instances, where the disease has been superficial, and that part of the conjunctive coat which is expanded upon the Cornea has been elevated and thickened by an extravasated opaque fluid deposited underneath it, I have restored my patients to sight by a removal of the obstacle with a fine sharp instrument.—If the Cornea should be so much affected, as to project considerably forwards; and by the size and shape of the projection, pain and deformity are the consequences, accom-

accompanied by an inability of shutting the eye-lids; it will then be adviseable to remove a large circular piece of the Cornea, or the whole of it, that the vitiated humours of the eye may be discharged; by which means the disagreeable and painful symptoms disappear; and sufficient space is left for the application of an artificial eye to the socket, if such a substitute be approved of.— Before I finish my remarks on this subject, perhaps it may not be improper to observe, that in some instances the whole eye, from an original defect of the vessels, coats, and humours of the internal parts of the globe, becomes so greatly enlarged, as to push out considerably from the bony orbit, producing great deformity and acute pain, extending to the membranes of the brain, and the brain itself; which admits of little or no remission from pain, but what is procured by opiates, and gentle evacuations. Within these three years I have had two patients under my care, with this species of disease: the one was a young lad of about fifteen or sixteen years old, in other respects healthy; the other was a young lady, about thirty years of age, with a very unhealthy aspect, and infirm state of body. The young man's eye was become rather more than twice its natural size; the humors in the eye preserved their transparency, so that I had an opportunity

portunity of easily discovering, that the pupil of the eye was greatly enlarged, and that there was no motion left in its muscular fibres, the external coats of the eye were put much on the stretch, and some of the lymphatic arteries of the Tunica Conjunctiva were replete with blood: his pain was great, and almost continual; and it had long been so severe, as to compel him to submit patiently to any expedient that might be thought adviseable for his relief; and particularly so, as every method that had hitherto been tried, had proved ineffectual. I proposed the extirpation of the eye, as the only chance, I thought, could be offered—He readily embraced the proposal, and I performed the operation with a sharp round-edged knife, of a small size, with a strait blade, a common dissecting hook, and a knife with a convex blade, made in a singular manner, well adapted to this and sometimes to other purposes; a drawing of this instrument I have given in the third edition of my Cases in Surgery. There was no hæmorrhage in consequence of the operation, but such as was easily suppressed by soft dry lint. The whole globe of the eye, together with the Optic Nerve, even with the Foramen of the Os Spheroïdes, through which this nerve passes from the brain, was removed. Soon after the operation, the poor lad

was a good deal convulsed; and for the space of twenty-four hours, frequent retchings to vomit, joined with considerable pain in the head, ensued; but by abstinence, bleeding at the arm, giving him opiates, and febrifuge medicines of the saline kind, repeated at proper intervals, his symptoms gradually abated; and he continued to go happily on, till his cure was compleated; which happened in about five weeks, without any further inconvenience.—The young lady's case, I have just now mentioned, was in all respects infinitely worse than that of the young man. Her disease was of much longer continuance. The globe of the eye projected so much from its orbit, as to put on a terrible aspect; the tumor was much larger than a hen's egg, but of a different shape: the external coats of the eye were much thickened, and nearly resembled raw flesh, in their colour and texture. The internal coats and humors of the eye had totally lost their form and transparency; they assumed the appearance of ragged, soft substances; and were mixed with a dark-coloured, thick fluid. The greatest part of the fluid escaped, as soon as an opening was made into the cavity; the incision was directed from above downwards, so as nearly to describe a semicircle, which gave me an opportunity of extending my incision
round

round the whole diseased parts externally, so as to describe a complete circle. This being effected, I directed my knife to the bottom, and lateral parts of the bony socket; and removed all the muscles from their origin, as well as the whole of the Tunica Sclerotica, together with that part of the Optic Nerve which passes through the Foramen Opticum of the Sphenoidal bone. A fluctuation in the tumor was slightly discoverable before the operation; which I thought a favourable circumstance; but till the operation was put in practice, I was at a loss about the true nature of the contents of the swelling. This young lady had, for more than seven years, endured so great a degree of pain, as to deprive her of her natural rest and appetite: when she put herself under my care, she appeared emaciated, infirm, fallow, and dejected; latterly she had been attacked with fainting and convulsive fits: of which she had frequent returns. Various methods had been tried for her relief, previous to her coming to London; and amongst the rest some painful topical applications had been used. These proved not only ineffectual, but added to her distresses. I advised the extirpation of the whole diseased part, as the only chance that could reasonably be proposed for her recovery. She submitted to it with reluc-

tance and great apprehensions; however, I performed the operation in the manner I have already described. There was nothing found necessary for restraining the hæmorrhage, but dry lint mixed with wheat-flower; with which the whole cavity of the orbit was lightly filled up: upon the lint was placed a pledgit of fine tow, spread with Ceratum Album: and over the dressings a soft linen roller was applied, with a moderate degree of tightness.—For some days after the operation, she had severe pains in the head, and a considerable degree of fever, attended with frequent retchings to vomit, and inquietude.—Opiates, clysters, and medicines of the diaphoretic kind, were occasionally prescribed, and submitted to; which methods, joined with the loss of eight or ten ounces of blood from the arm, produced their desired effect.—The third day after the operation, fresh dressings of the softest kind, preceded by emollient fomentations, were carefully and tenderly applied to the part; observing, at the same time, not to remove any of the original applications, either at this or any other time, but such as were loosened, and detached from the rest.—In consequence of these necessary precautions, the patient at no time of dressing endured much pain.

The orbit of the eye, in about ten days after the operation, began to produce granulations of a favourable kind; and so it continued doing, till the greatest part of the cavity was nearly filled up with a firm and solid substance. The wound, in about six weeks, was smoothly healed, without its being ever necessary to have recourse to painful applications.—During the last two or three weeks, the Cortex Peruvianus, sometimes in decoction, sometimes in substance, was given, with a view of strengthening the habit of body, and promoting the healing of the wound; both which designs were visibly promoted by this medicine.

N. B. When the disease of the eye is of a cancerous nature, the tumor sometimes takes its rise from the brain; and is accompanied with an adhesion of the globe itself, and its neighbouring parts, to the bony orbit; which is often found to be carious; under such circumstances, no severe operation in surgery ought to be performed, with a view of curing, or even relieving the Patient.—Such an attempt must necessarily be productive of great mischief, by aggravating and increasing the severity of the disorder; which, in its worst state, may be in some degree relieved, by local applications of the most emollient kind, assisted by gentle evacuations,

cuations, a soft, nourishing diet, and the Extractum Cicutæ given internally in proper quantities, and at proper intervals; joined, if necessary, with a fomentation and cataplasm of the same herb, applied two or three times a day to the diseased part; observing, at the same time, to keep the body from costiveness; and to join opiates with the Cicutæ, if that medicine alone should not be found equal to the design of giving ease, and promoting rest.

The propriety of treating this species of disease with the utmost gentleness, may very reasonably be produced as an exception to the following physical maxim, "That a doubtful remedy is better than none;" and more especially as we may assure ourselves, from the result of experience in this, and some other melancholy cases, that severe remedies have frequently worse consequences than the diseases themselves.

Before I finish my remarks on this subject, it may be proper to observe, that although the Cicutæ seems rather to lose than gain credit in this kingdom; I am nevertheless convinced, from the result of my own experience, that it is a medicine which oftentimes proves signally serviceable; since to this herb many of my Patients in the hospital, as well as those who are in a much
higher

higher rank of life, are much indebted, for the preservation of some of those parts, amongst many others of less note, which nature has formed and designed, as the utmost consequence to manhood; which parts were condemned by some of the experienced in surgery to extirpation, as being thought incapable of relief by gentler methods. My own experience and observations have induced me to think favourably of the *Cicuta* in many cases, though by no means in all. When I have used the *Cicuta*, or its extract, in ulcerated cancers, as an internal medicine, as well as an external one; I mean as a foment and cataplasm; I have very often found it to be of little or no service to my Patients. But where there is an indurated tumor or tumors of the glandular parts, having the general symptoms and appearances of a *Schirrus*; such as a stony hardness, an enlargement, an inequality of surface, and distended blood-vessels, joined with obtuse pain in the part deeply situated; in such instances, I say, I have several times succeeded to the utmost of my expectations, and the wishes of the distressed, by giving the *Extractum Cicutæ* internally; using it at the same time as a foment and cataplasm, applied twice a day to the part affected. In some instances the remedy has been found effectual in two or three

months, or a shorter time; whilst, in others, I have known it require a perseverance for six, seven, or eight months. The manner in which I have given the *Cicuta*, is in general with a decoction of the Peruvian Bark, occasionally mixed with a small quantity of Rhubarb, to prevent costiveness.—The quantity of the *Cicuta* administered, must be proportional to the age and strength of the Patient, and it must be gradually increased; observing first to begin with moderate doses of it. Before it be administered, it will be adviseable to empty the bowels properly, by giving two or three purges: and if the Patient, at any time during the course of the *Cicuta*, complains of sickness at the stomach, dimness of sight, or giddiness; which symptoms are now and then known to occur; these attacks will soon be removed, by lessening the quantity of the medicine, or by totally omitting it for a few days; remembering, at the same time, to give one or two purges, or an emetic, if this happens. When these symptoms disappear, the *Cicuta* should be repeated and continued as long as may be thought proper. In adults I generally begin with twelve, fifteen, or twenty grains of *Extractum Cicutæ*, more or less, agreeably to the strength of the Patient. The *Cicuta* must be made into pills, and divided

ded into equal proportions; so that one third may be given three times a day, at proper intervals of time: each dose of the pills must be washed down with two ounces, or more, of the *Decoctum Corticis*: in some instances I have gradually increased the *Extractum Cicutæ* to the quantity of ʒjss a day, and upwards.

In ulcerated Cancers, making great destruction of the integuments, muscles, and glandular parts, upon the thorax and other parts of the body, I have experienced great advantages from the use of the Peruvian Bark, and powder of Serpentry, given in considerable doses, and repeated at proper intervals, without the *Cicuta*.—The powder of *Cortex* alone, made into draughts with the tincture of roses, has proved very efficacious, in cancerous ulcerations, accompanied with profuse hæmorrhages; observing, at the same time, to refrain from improper diet of all kinds, and to acidulate the Patient's liquors with the *Spiritus Vitrioli Tenuis*; unless these acids prove hurtful to the stomach and intestines: which they are known sometimes to do. Opiates, of the cordial kind, must be occasionally administered, to give ease, and procure rest under painful circumstances; and the body must at all times be kept moderately open.—Every local application to the wound, when in a tender

der state, without hæmorrhage, must be of the softest kind; but, when hæmorrhage demands it, such applications as are known to be most effectual for these purposes must be had recourse to: such, for instance, as the agaric of oak, prepared sponge, puff-ball, lint and wheat-flower, or lint dipped in spirit of turpentine made hot: these applications must be kept on the part by pressure, with bandage, or by the hand of an assistant; after having first applied a pledgit of lint, or tow, or both, on the part, spread with a soft cooling ointment, such as *Ceratum Album*, or *Linimentum Album*.

N. B. If it be urged as an argument, in opposition to the use of the *Cicuta*, that a confirmed *Schirrus*, or in other words a cartilaginous-like texture of a gland, whose center, upon enquiry, after extirpation, appears to form a cavity, that contains an extravasated fluid, resembling thick coffee, cannot be made to submit to any other treatment than manual operation, I readily agree to this opinion; but, before the disease arrives at this state, which, indeed, constitutes the true characteristic of a *Schirrus*, the *Cicuta* may very probably do what afterwards it is found incapable of; and sometimes the habit of body will be much mended by this medicine joined with the *Cortex*. Of the follow-

ing maxim we may rest perfectly assured, That a Schirrus and Induration are distinct diseases; and that, although every Schirrus is an Induration, yet every Induration is not a Schirrus: the want of a proper distinction of which fact, I am inclined to think, has misled some ingenious men, who are deservedly esteemed eminent in their professions.



OF THE TUNICA SCLEROTICA, AND TUNICA CORNEA.

The Sclerotica, five Cornea Opaca, and the Cornea Lucida, are, in fact, one and the same coat; though very differently circumstanced as to size, situation, texture, and use. The Sclerotica is a large, firm, thick, hard, opake membrane, composed of several strata closely united. It is extended from the external circumference of the Cornea to the Optic Nerve; and forms by much the greater part of the globe of the eye externally. The Sclerotica and the Cornea compose the case, in which all the internal coats of the eye, and its humors, are contained. The Cornea, when compared with the Sclerotica,

tica, is but moderate in size, forming only a small segment of a circle. The Sclerotica, on its posterior part, is perforated obliquely in five or six different places by those branches of the internal carotid artery, that are bestowed upon the internal coats of the eye, and its humors; which vessels by Nuck are called Aquæducts. From this anatomist they are termed Aquæductus Nuckii, five Ductus Oculorum Aquosi; upon the supposition that they conveyed lymph into the eyes from a neighbouring source. By Hovius they are called Neuro-Lymphatica Vasa Adducentia.

The Cornea Lucida is composed of several Laminæ, and is the anterior portion of the Sclerotica. This coat, from its transparency and situation, admits of the Tunica Iris; the Pupil of the eye; and the CrySTALLINE Lens, with its investing Membrana Aranea, being easily seen and examined into; provided the Aqueous Humor and the Pupil be in their natural state: but, when the Cornea becomes thickened, or the Aqueous Humor becomes turbid, or the Pupil becomes totally contracted; from one, or either, or from all these causes, no judgment can be formed of the state of the eye beyond the Iris.

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The Cornea is prominent, or externally convex; but it is more or less so in different subjects. This convexity, together with the natural convexity of the Crystalline Lens, serves to refract and converge the rays of light in a greater or smaller degree, in proportion to their roundness, or convexity; and to bring the several rays of light together, more or less immediately, to form a distinct picture behind the Crystalline Lens; which point of union, or contact, is called the Focus of the eye. Those eyes which are very convex render the subjects near-sighted, and incapable of distinguishing objects with precision and accuracy, when held at a distance; which puts them under the necessity of holding the object very near their eyes, to enable them to read, write, work, or to distinguish the different features of the different faces of their friends and acquaintance. To remedy this inconvenience, such people are necessarily obliged to make use of a glass, or spectacles, of a concave form; which degree of concavity must be proportioned to the greater or less degree of convexity of the eyes, to enable them to see with satisfaction and pleasure at the same distances that a well-formed eye is capable of doing. On the contrary, when the Cornea and the Crystalline Lens are of a more than usually flat construction; under
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such circumstances, the objects must be placed at a considerable distance to enable them to see with accuracy and distinctness. To remedy this defect and inconvenience, a glass, or glasses, of a due degree of convexity or roundness, must be substituted for this purpose: for as, in a more than usually round or convex eye, the rays of light approach each other, and are brought to a point before they reach the bottom of the eye, where the Retina is situated; and by this means render vision confused and imperfect: so, in a depressed or flatly-formed eye, the different rays of light will not meet soon enough behind the Crystalline Lens to form the Focus upon the Retina, but behind it; and this will always happen, unless a convex-glass, or glasses, be used for the purposes of refracting and converging the rays of light in a greater degree than the flatly-formed eye can do of itself. When the rays are much converged, the person, whose eyes want the aid and assistance of a concave-glass, or glasses, is termed Myops, or short-sighted, or pur-blind; the person, whose eyes stand in need of a convex-glass, or glasses, is called Presbus, or long-sighted, or old-sighted: the latter is a defect of sight, to which old people are more subjected than young. However, it should be remembered, and probably it may be remembered

bered too with some satisfaction, by those who in youth are of the near-sighted tribe, that, as they advance in years, their sight will improve, by the eyes becoming more depressed or flattened than they were in youth, from a natural tendency in these parts to become so; and by these means the eyes will then be able to see those objects with accuracy at such distances as, till now, they had no power of doing.

As it is very difficult, nay, hardly possible, for the Surgeon to determine from his own experience, of what degree of convexity, or concavity, the glass, or glasses, should be constructed, to assist properly the imperfection of many people's eyes, that are too round, or too flat, in their make; I have often found it expedient to refer them to the shop of an optical instrument-maker, to choose for themselves; which they can better do, than can be done for them. Perhaps, it may not be improper to remark in this place, that in those eyes in which the Cornea Lucida is most prominent and convex, the Tunica Iris will be found at a greater distance from the Cornea, than in those eyes that are of a different shape; and that the instrument will be less likely to wound or injure the Iris in an eye that is formed with a convex or prominent Cornea, than in an eye that is formed with a flat

flat or depressed Cornea, when the operation of incising the Cornea, and extracting the CrySTALLINE Lens, is attempted by the operator, to restore those eyes to sight which are afflicted with the disease called Cataract: in the former instance, the anterior chamber of the eye is larger than in the latter; and therefore more or less space is left for the introduction of the instrument into the anterior chamber of the eye, proportional to its size. Since, then, so convex a body, as the CrySTALLINE Lens appears to be, is quite discharged from the eye by the operation of opening the Cornea, and extracting the Cataract, or is removed from its bed, by depressing it below the Pupil in the operation of couching; it must necessarily happen to those eyes which have been thus operated upon with success, that they must be assisted with convex-glasses, as substitutes for the loss of the crystalline humors.

OF THE INTERNAL COATS OF THE EYE; AND OF THE HUMORS OF THE EYE.

THE internal tunics, or coats, of the eye are known by the following names. 1. Tunica Choroides;

roïdes; 2. Tunica Iris; and, 3. Tunica Retina. The Tunica Choroides and Tunica Iris are, in fact, one and the same membrane. The internal surface of the Choroides, called the Ruyfchian coat, from Professor Ruyfch, or the vascular coat, from its texture, immediately invests the external or posterior surface of the expanded, soft, and medullary substance of the Optic Nerve called Retina; and the external surface of this membrane invests the Sclerotica on its internal part, to which it is firmly attached by numerous vessels. The Tunica Iris, or anterior portion of the Choroides, is, by almost all Anatomists, treated of as a distinct coat of the eye. This coat is of different complexions in the eyes of different people; and sometimes too it is observed to be of different shades, or colours, in one and the same eye; from whence its name is derived. A little way behind the Iris are placed the Processus Ciliares. The Tunica Choroides, Tunica Iris, and Processus Ciliares, appear from injections to be almost wholly vascular. Very near, but not quite in the middle or center of the Iris, is a circular hole, commonly called the Sight of the eye; but, by Surgeons and Anatomists, this hole is termed the Pupil of the eye. The posterior surface of the Iris, the Processus Ciliares, and a part of the Tunica Choroides,

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roïdes, are covered with a black Mucus, for the purposes of accurate and distinct vision: the removal of this black slime from the Choroides, the Iris, and the Proceſſus Ciliares, gives us an opportunity of discovering the natural complexion of theſe parts, as well as the manner in which they are conſtructed. The Iris is composed of two orders of fibres, which are diſpoſed in different directions: theſe fibres, from their courſe, are known by the following appellations; the Longitudinal fibres of the Iris, and the Circular fibres of the Iris. The Longitudinal fibres of the Iris are thoſe which tend in Radii, going from the external or larger circumference of this membrane to the internal or ſmaller circumference of it. Where the Circular fibres of the Iris commence, and ſurround the Pupil, they appear ſomewhat prominent behind the border of the Pupil. The Longitudinal fibres of the Iris, and Circular fibres of the Iris, act as antagoniſts to each other. When the Longitudinal fibres of the Iris contract, the Pupil becomes more than uſually dilated, by their drawing the Iris equally on every ſide towards its origin, or adheſion to the Ligamentum Ciliare. The Ligamentum Ciliare is a circular line, ſomewhat elevated, and placed betwixt the termination of the Sclerotica on its anterior part, and

and near to that part where the Cornea commences; to the Ligamentum Ciliare the edge or border of the Choroides is firmly attached. The Circular fibres of the Iris, when they act forcibly, contract the Pupil of the eye, by overcoming the force or power of the Longitudinal fibres of the Iris. The Muscular fibres of the Iris, and the Processus Ciliares, are of a whitish or light-brown colour. When the black pigment is removed, the Processus Ciliares then appear to be at some distance from each other, whose interspaces are filled up with the black Mucus already described. These fibres are continuations of the posterior Lamina of the Iris, or rather of the anterior Lamina of the Choroides. The space between the interior and concave surface of the Cornea, and the anterior surface of the Iris, is termed Camera Anterior, or the fore-chamber of the eye. The space betwixt the posterior surface of the Iris, and anterior surface of the crystalline humor, with its investing membrane, is termed Camera Posterior, or the back-chamber of the eye. The Camera Anterior, or fore-chamber, of the eye, is much larger than the Camera Posterior, or back-chamber of the eye. Both these spaces are completely filled with the aqueous humor.

The third internal coat of the eye is the *Tunica Retina*. In colour it is somewhat white; in texture it is thin; in consistence it is soft and tender. This membrane is extended from the contracted extremity of the *Optic Nerve*, as soon as it has passed through the *Sclerotica* and *Choroïdes*, quite to the extremities of the *Processus Ciliares*. The *Retina* is uniformly expanded upon, and attached to, the internal surface of the *Choroïdes*. Amongst Anatomists, this membrane is now, I believe, universally supposed to be the immediate seat of sensation and sight.

By the antients, the *CrySTALLINE Lens* was supposed to be the immediate organ of vision. By *Mariotte*, the mathematician, and his contemporaries, the *Choroïdes* was supposed to be so.

In the cavity of the globe of the eye, or rather in its two cavities, into which we find the globe of the eye is divided by the *Tunica Iris*, though unequally, we readily discover three colourless humors of very different compositions: which, in their natural and sound state, are equally transparent. From their different resemblances, they are called the *Aqueous Humor*, the *CrySTALLINE Humor*, and the *Vitreous Humor*. These humors, together with the *Cornea*, serve the three following notable purposes, essential to sight.

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They refract the rays of light; they converge the rays of light; and they bring the rays of light together on the bottom of the eye, so as to form a distinct image of the object we look at; which place of contact is termed, by Opticians, the Focus.

The Focus of the eye, then, is the point where the rays meet, and cross the Axis after refraction by a glass, or, in other words, the part where the rays converge, and form upon the Retina an exact resemblance of the thing we look at, in size, shape, and colour, though in an inverted position.

This will be almost always the case; unless the anterior membrane of the eye, termed Tunica Conjunctiva, be changed from its natural color, by means of the contents of the lymphatic vessels of this coat being tinged with yellow by the reflux of the Bile into the mass of blood; which we know is a common circumstance with those who are, to a great degree, afflicted with the Yellow Jaundice: for, as the Conjunctive Coat is expanded forwards, so as to cover the whole external and convex surface of the Cornea; all the rays of light, which are transmitted through the Cornea, the Aqueous, the Crystalline, and Vitreous Humors, to the bottom of the eye, to constitute the Focus, must of ne-

cessity pass first through the expansion of the Conjunctive Coat ; and by these means a similar effect will be produced from this cause, and for the same obvious reasons too, as is brought about by looking through a yellow pair of spectacles. From this simple experiment it will appear, that the objects which we look at will appear yellow ; if the spectacles be made of green-glass, the idea impressed upon the mind will be that of green ; if the spectacles be made of blue-glass, our ideas of the colour of objects will then be changed to blue ; and so on.

The humors of the eyes, from these simple experiments, cannot possibly receive any change in their colour : nor does it seem at all necessary they should do so, to produce such effects ; since the colour of the object we view depends upon the first medium through which the rays of light pass, and not through the second, third, or fourth medium.

I have, at different times, had opportunities of conversing with Patients afflicted with the Yellow Jaundice to a great degree ; the Conjunctive Coats of whose eyes were deeply tinged by the disease : from time to time curiosity has induced me to question them on this matter. They all informed me, who were in this situation, that to them objects appeared yellow ; and so they continued

tinued to do till the disease was in part removed; when objects appeared yellowish. At length, when the disease was so much better, that the eyes had resumed their natural complexion, they distinguished colours as they had been used to do before they were ill.

The Aqueous Humor lies loosely in the cavity of the eye, and fills up the whole of the anterior and posterior chambers of that organ. In the Aqueous Humor the Iris is suspended: this coat is in part supported, and preserved in an expanded state, by the uniform pressure that is made upon its surfaces by the Aqueous Humor. The Aqueous Humor is the thinnest, or rarest Humor of the three that are contained within the coats of the eye; for which reason, the rays of light, in their passage to the Retina and Fund of the eye, are less refracted and converged by this humor, than they are by the Crystalline or Vitreous Humor; which two Humors are more dense and solid than the Aqueous Humor, though equally transparent.

All the rays of light that are refracted by the Cornea, those only excepted which are transmitted through the Pupil, are in part reflected, and in part buried, or absorbed, by the Iris, on account of the opacity of its posterior surface. The latter effect (suffocation of the rays of light)

is more fully produced by the black-pigment of the *Processus Ciliares* and *Choroïdes*, than can be done by the external surface, or *Lamina*, of the *Iris*: and this must be in a degree proportional to the different degrees of opacity in their colors; since, from the result of some ingenious experiments relative to this matter, it appears, that all light colors are disposed to reflect the rays of the sun more powerfully, than dark colors can do; consequently, dark colors will attract most of those luminous rays which light colors repel. By this wise contrivance in the composition of the eye, distinct vision is produced; which otherwise would be confused and indistinct.

The Aqueous Humor is plentifully secreted by the extremities of the most minute Lymphatic arteries of the *Iris*, called by some *Ductus Aquosi*. Through the mouths, or orifices, of these vessels, this thin watery fluid, or Lymph is discharged, and deposited in the two chambers of the eye. Corresponding with these vessels are proportional numbers of minute Lymphatic or Absorvent veins, which receive, and occasionally return a proper quantity of this thin fluid into the larger veins; and so on into the course of the general circulation. By a similar construction of parts, the Crystalline and Vitreous Humors are secreted, provided, and returned; and their pu-

rity and transparency are thus equally preserved. The Cryſtalline Humor, or Lens, is ſituated immediately behind the Aqueous Humor, at the termination of the poſterior chamber of the eye; this is by much the moſt firm, ſolid, and compact body of the three. The Cryſtalline is compoſed of Lamina like an onion; though by no means are they ſo diſtinct: it is originally and naturally colourleſs.

From the nicest enquiries, it appears, that, at the ages of twenty-two years and fifty years, in different ſubjects, the Aqueous and Cryſtalline Humors were nearly, if not quite, equal in weight. In the younger ſubject, the weight of each of theſe Humors, as well as in the older, amounted to four grains. In the younger ſubject, the weight of the Vitreous Humor was equal to ninety-five grains; in the older ſubject, the weight of this Humor amounted to one hundred and four grains. So that, at the age of twenty-two years, the weight of theſe Humors was nearly in proportion as twenty-four to one; and, in the latter, as twenty-fix to one. The weight, therefore, of theſe Humors in the human eye, at a medium, may be eſtimated as twenty-five to one.

As we advance in age, the ſolidity and firmneſs of the Cryſtalline Humor increaſe. In advanced

vanced age, the Cryſtalline frequently changes its complexion to an amber colour, without loſing its transparency: this Humor however gradually loſes its convexity. Theſe facts are very neceſſary to be remembered by thoſe, whoſe profeſſions lead them to praſtiſe this branch of ſurgery. The Cryſtalline Humor is lodged and confined in a cavity on the anterior ſurface of the Vitreous Humor; which cavity is inveſted by a very fine membrane, called Tunica Vitrea.

The Tunica Vitrea, at the edge or circumference of the Cryſtalline Lens, is divided into two Laminæ. The anterior Lamina is extended forwards; covers the Cryſtalline Lens, and makes a bag for its reception. The membrane of the Cryſtalline Humor is termed Aranea, or Arachnoïdes, from the delicacy of its texture; this coat is generally known amongſt Surgeons by the more eaſy and familiar term Capſula of the Cryſtalline Humor; which name is derived from its office.

The Cryſtalline Humor, in ſhape, is ſomewhat convex: in transparency, it reſembles cryſtal; from its form it is termed a Lens. This body is obſerved to be more prominent, round, or pointed, on its poſterior, than on its anterior ſurface.

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It derives its small vessels from the *Processus Ciliares*, which are branches of that vascular circle, placed behind the *Iris*, termed *Circulus Arteriosus*.—The *Circulus Arteriosus* is formed by ramifications, proceeding from the internal carotid artery.

These minute vessels enter into the body of the *Crystalline* and *Vitreous Humors*, through the *Capsulæ*, in the shape of very fine *Lymphatics*.

The *Vitreous Humor* is situated behind the *Crystalline Humor*, and is much greater in quantity than the other two *Humors*, when considered together; as already has been observed; and consequently occupies by much the greatest part of the cavity of the *Globe of the Eye*.—The *Vitreous Humor* is a fluid of a gelatinous kind: it is contained in a very fine membrane, or coat, termed from its situation, *Tunica Vitrea*; from the delicacy of its texture it is termed *Arachnoïdes*.—The *Vitreous Humor* resembles the white of a raw new-laid egg, or fused glass.—The internal *Lamina* of the *Vitrea*, not only invests the surface of the *Vitreous Humor*, as its external *Lamina* does the *Crystalline*; but it dips down, insinuates itself into the substance of the *Vitreous Humor*, and is separated into a variety of distinct cells
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or bags ; in which bags are deposited different portions of this Humor. The Tunica Vitrea is rendered visible, by putting the whole of this Humor into a glass of clear water ; but its distinct cells cannot be made visible without the assistance of an acid liquor to coagulate it withal.—The Vitreous Humor consists principally of a Congeries of Lymphatic vessels ; which are derived from the numerous vessels of the internal Lamina of the Choroides.

The Tunica Vitrea is grooved on its surface, in a variety of places, for the reception of the Processus Ciliares. These Sulci are black as the interspaces of the Processus Ciliares are ; from their use they are termed Sulci Ciliares.

The Crystalline and Vitreous Humors, from the circumstance of their being encysted, admit of being easily taken out of the eye, in a recent subject ; and when the Cornea and Iris are wholly removed, these Humors will bear an inversion of the parts, from the natural strength of the Aranea, without subjecting the Lens to escape immediately from the bed of the Vitreous Humor ; and the Lens will preserve its conjunction with the Vitreous Humors, till the Capsula of the Lens is broken, torn, or divided ; but so soon as this happens, the Lens immediately escapes from the Vitreous bed, and falls out.

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This circumstance is necessary to be attended to by the Operator who undertakes to assist his Patient's sight, by endeavouring at a depression or extraction of the Cataract; for, till the Capsula be opened, the diseased CrySTALLINE Humor can neither be removed below the Pupil of the Eye, by the couching needle; nor can it be safely extracted through a wound made by incising the Cornea, without running too great a risque of breaking the cells of the Tunica Vitrea, and discharging a considerable portion of their contents: the consequence of which will probably be, a depressed globe, attended with irrecoverable blindness, as I have sometimes seen.—The Aqueous Humor, by lying loosely in the anterior and posterior chambers of the eye, as well as by reason of its fluidity, will immediately be evacuated, when the Cornea is incised: in consequence of which evacuation, the Cornea and Iris lose that support, and resistance, which they before received from the Aqueous Humors: from this moment the Cornea becomes flaccid, rumpled, and uneven on its surface; and depressed to so great a degree, as to sink down upon the anterior surface of the Iris. Again, the Iris subsides, and comes in contact with the CrySTALLINE Lens: the two chambers of the eye are now no more; and at the

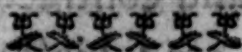
the same time the Pupil becomes unusually dilated.—The two last circumstances of the Tunica Iris, lying upon the anterior surface of the CrySTALLINE Lens, and the enlargement of the Pupil of the Eye, are, I think, worthy of observation, by the Operator who attempts the extraction of the Cataract: for when the Iris sinks down, and lies upon the Lens, it will be just the same thing in effect, as though the Lens was advanced forwards; and it will enable the Surgeon to divide the anterior portion of the Capsula of the CrySTALLINE Lens with much more ease and safety, than he could possibly do, were this Humor at as remote a distance from the Iris: as it is known by the skilful in Anatomy to be, when the posterior chamber is replete with the Aqueous Humor.—Again, the Pupil being enlarged, and the Iris rendered flaccid, the Cataract will be made more easily and readily to escape through the Pupil into the anterior chamber of the eye; and from thence through the opening made into the Cornea, than it could possibly be made to do, were the Pupil contracted and the Iris extended.—In short, in the one instance there will be a large hole for the diseased Lens to pass through, accompanied by a flaccid membrane, capable of making but little resistance to the Cataract: in
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the other instance, there would be a resistance to the Cataract from the Iris; were that membrane not flaccid; and from the Pupil too, were that small and contracted.—The internal coats of the eyes are subjected to inflammation and obstructions, as the external coats are; though perhaps not so frequently: when they are attacked with diseases of this kind, assistance cannot be too immediately given, by such methods as are advised on the head of Inflammations of the Conjunctive Coat, and Ciliary Glands; and if the disease does not speedily give way, the consequence is generally bad, arising from the turbidness of the Humors, and an opacity of the Aranea and Tunica Vitrea, as well as a thickness of the Iris, together with an adhesion of this membrane to the Crystalline, and a contraction of the Pupil. The inflammation sometimes terminates in an Abscess. The pain arising from an internal inflammation of the eye, is generally more acute, and more dangerous, than from an external inflammation, and consequently more distressing to the afflicted Patient.

When an Abscess is formed in the cavity of the eye, the disease is called Hypopyon; to remove which, an incision must be made through

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the inferior part of the Cornea ; provided it be attended with pain and deformity.



OF THE CATARACT.

THAT disease of the globe of the eye, which is distinguished from other diseases of this part by the term Cataract, is sufficiently known to the experienced in Surgery to be an affection of the CrySTALLINE Humor of the eye.

When the Cataract is confirmed, there is such an opacity of the CrySTALLINE Humor as totally obstructs the rays of light in their passage, and consequently prevents them from producing such effects upon the bottom of the eye, as are brought about in a transparent or undiseased state of this Lens ; provided the Retina and Vitreous Humor be perfect, and the Cataract is not complicated with any other affection of the eye. But, though the Cataract be impervious to the rays of light ; it must be remembered, that some of these rays pass obliquely betwixt the Iris and Cataract ; and the eye distinguishes light and glaring colours. To have a competent knowledge of this disease, and to be enabled

bled to distinguish it from any other defect of the eye, it is previously necessary to be thoroughly acquainted with the situation of the Crystalline Humor, with the changes of colour this Humor naturally undergoes in some subjects at different times of life; and likewise to know, that, when the Cataract is complicated with any of the following circumstances, to wit, a considerable change of the shape of the globe of the eye, a thickness and cloudiness of the Cornea, an insensibility of the Retina, it is absolutely wrong to attempt the operation of couching. It is likewise necessary to be assured, that the success of this operation, which at best is precarious, is much more so when there is an adhesion of any part of the diseased Crystalline to the Tunica Iris. In this disorder, it is not only proper to be acquainted with the manner of performing the operation, but to distinguish whether the case be not attended with such circumstances as may render the success of it more than usually uncertain, if not absolutely improper. To discriminate whether the globe of the eye be, or be not, changed from its natural size and shape, is not at all difficult, by comparing it with a sound eye, or by merely reflecting upon its natural form. If the Conjunctiva or Cornea be thickened, that circumstance may be readily

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known, by remembering that these are the anterior coats of the eye, and therefore cannot well be mistaken for the Cataract, which is an opacity of the internal part of the globe, whose situation is opposite to, and a little way beyond the Pupil, by looking through which, the disease will discover itself by the Crystalline being changed into a cream colour, a pearl colour, a yellow colour, or a darkish grey, &c.

If there be such a defect in the expansion of the Optic Nerve as renders it insensible, and this be the only disease, the Patient's eye will not be affected by the strongest light: the eye will be perfectly transparent; the Pupil will be generally dilated; and there will, in most instances, be no motion at all of the fibres of the Iris; at least, the motion of the Pupil will be so small, as to be distinguished with difficulty.

From these several circumstances being compared with those relating to the Cataract, it will be easy to understand the difference betwixt the few diseases of the eye I have here taken notice of. However, I am convinced, the best method that can be taken to inform those who have but a superficial idea of the structure and diseases of the eye, is to exhibit three eyes; the first with a thickness and opacity of the Cornea; the second, with a Gutta Serena;

Serena; the third, with a Cataract; which I have often done, for the information of such whose educations had not entitled them to acquire a sufficient knowledge of these diseases; by which means they have received more immediate and permanent instructions than they could otherwise have acquired.

To explain what is meant by an adhesion of the Cataract to the Iris, and to convey such an idea of this circumstance to those who have not acquired a previous knowledge of the parts, I am apprized, is a task that is attended with some difficulty; because, it is first of all necessary to know, that the Crystalline Lens is at a small distance from the Iris in its natural state, and by this means forms the posterior chamber of the eye. However, I may venture to pronounce, that, under these circumstances of the disease, the Crystalline Lens is either moved forwards, or the Iris is moved backwards, to produce this effect; and that, if there be a complete adhesion of these two parts, the original space betwixt the anterior part of the Crystalline Humor, and posterior part of the Iris, becomes lost; the action of the Pupil ceases; and the rays of light are incapable of being transmitted beyond the Iris and Cataract: on which account, there is no degree of sight in that eye;

so that the state of the Retina and Vitreous Humor, consequently, cannot be judged of; which are sufficient reasons for forbidding the operation of couching.

If it be urged, that, under such circumstances, it may be adviseable to perform the operation of dividing the Iris above or below the Cataract; I answer, that the same objections are to be made to this attempt. In short, to speak plainly and fairly, however ingenious that operation of dividing the Iris may be thought (in case of an absolute contraction of the Pupil, or of a perfect adhesion of the Cataract to the Iris), which was invented and recommended by that great operator Mr. Cheselden; I must confess, I never yet saw a single instance of success from it; and therefore cannot recommend it as an adviseable operation under any circumstance whatsoever.

If the adhesion of the Cataract to the Iris be in part only, and the Retina be perfect; there will be a sufficient quantity of the rays of light transmitted obliquely, betwixt the Iris and Cataract, to the lateral parts of the Retina, to enable the Patient to distinguish light, and sometimes too such bodies as are white or red. Under these circumstances of the disease, the operation is adviseable, in expectation of affording that

that relief to the blind, which they, by any other means, have very little or no chance of attaining to: the probability of which may be learned from the following case of W. L. But, before I proceed to relate it, I must observe, that, if one eye only be affected with a Cataract, and the other be perfectly sound, or in a considerable degree useful, the operation should never be undertaken, even supposing the disease to be of the most favourable kind: for, let the success of the operation be ever so happy, the eye, from which the Crystalline Lens is removed, cannot be restored to a degree of perfection equal to that of the sound eye, without the assistance of a convex glass.



A SHORT ACCOUNT OF SOME EXTRAORDINARY FACTS ATTENDING THE OPERATION OF COUCHING,

W. L. aged twenty-six, about nine years before he applied to me, was suddenly attacked with a dimness in his eyes. The disorder continued for three years in much the same state; when it began to increase; and continued in-

creasing till he became incapable of distinguishing objects. He remained under these circumstances till March, 1748; when he came to London, and put himself under my care.

The disease was a Cataract in each of the CrySTALLINE Humors. The Cataract in the right eye appeared to adhere to the inferior and posterior part of the Iris, but without any defect or alteration in the shape of the Pupil. He was capable of distinguishing light and colours. In the left eye, the CrySTALLINE Humor was adherent to the greatest part of the Iris. The Pupil of this eye extended beneath the Cataract, and had changed its shape from a circular to a perpendicularly oblong form; through the lower part of which, a small share of light was admitted to the bottom of the eye.

From these circumstances, I judged it improper to meddle with the left eye; and, at the same time, considered the event of the operation as precarious in the right. However, I undertook it upon a probability of success, and couched the right eye on the third of April following.

Upon endeavouring to depress the Cataract, I perceived it to make a considerable resistance to the instrument; which was occasioned by its adhesion to the inferior part of the Iris: so that

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I was obliged to direct my needle underneath the Cataract, and lift it up, before I could disengage it from the Iris; this I effected with some difficulty, and at length depressed it.

The Patient suffered very little pain from the operation. In six days after, I examined the eye; when the Cataract appeared to have resumed its former situation.

On the third of May following, I couched the eye a second time. The Cataract now subsided much more easily than before. This operation was attended with as little pain as the preceding. Upon examining the eye a week after, I perceived the Cataract to have risen a second time; but so imperfectly, as to cover the lower half of the Pupil only; the upper half of it appeared clear; and he could distinguish letters through it by the help of a convex glass,

I was in hopes, from this appearance, that the Cataract might, in time, have subsided; as I have frequently known it do under the like circumstances. But, on account of the little pain the Patient had suffered from these operations, he insisted upon a third; which I performed upon the twenty-third of the same month; when the Crystalline was easily depressed. But such was the disposition of the

Cataract, that it rose up again, though in so shaking and wasted a condition, as to promise a speedy disappearance. However, the Patient being dissatisfied, and unwilling to return home upon a bare probability of its wasting away; I was prevailed upon to perform the operation a fourth time.

The Cataract subsided upon the slightest touch of the needle, and did not appear again.

The Patient, in a fortnight after the operation, was capable of reading and writing, with the assistance of a convex-glass; and he now sees well enough to follow his profession of surgery and pharmacy. It is remarkable, that there was hardly any inflammation, or pain, in consequence of either of these operations.

When this gentleman first began to look at a candle, or any other single object, it appeared to him multiplied; and, when he first read, he conceived of letters as remaining imprinted upon the bottom of the eye for some hours afterwards; but by a little use these phenomena were quite removed.

R E M A R K I.

From this example it appears, how difficult it is effectually to remove the Cataract, when complicated with an adhesion to the Iris: and,
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again, how warrantable it is to repeat the operation, with a probability of success, in such cases as are attended with the like favorable circumstances.

If the Crystalline had been totally removed by extraction, these returns of the disease could not have happened: but I am inclined to think, that, if this had been attempted, the operation probably would not have terminated so happily; since the Vitreous Humor must, in all likelihood, have been wholly, or in a great part, discharged, in endeavouring at a removal of the Crystalline; instances of which I have known, and attended likewise with such circumstances as to render a second operation impracticable. So that, however successful this method of operating may have proved in Cataracts that are free from adhesion; yet I think the operation is not likely to be attended with equal benefit, when they are otherwise circumstanced: and this conjecture I have found confirmed from experience.

R E M A R K II.

To this disease the eyes of people of all ages are liable, even from the birth to the most advanced time of life.

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It is no unusual thing for Surgeons to see children who were born with Cataracts: and I have seen an instance of a woman aged forty-four years, who was born with a complete Cataract in her left-eye, without the least defect of her right: in such case, no operation ought to be performed so long as the sight of one eye is perfect; which is sufficient for carrying on the common purposes of life: and especially too, as an eye which has been operated upon even with the greatest success does not prove equally serviceable with the undiseased eye: but, at the same time, it must be acknowledged, that it is more common to us to be advised with by Patients in the middle stage, or decline of life, whose eyes are attacked with this complaint.

Cataracts take their rise from very different causes. Sometimes they are the consequences of blows, wounds, or punctures; but not often. When they are produced from external causes, they are speedily confirmed, and are very seldom relievable by manual operation; because, at the time of the accident, some other parts of the eye suffer so much, as to render the disease truly complicated.

When the Cataract arises from an internal cause, the disease is always the consequence of Obstructions in the nutrient and secreting vessels
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of the Crystalline Humor; the most evident proofs of which are, the Cataract being the only visible defect of the eye, and the Patient's often receiving great advantages from an operation.

On children born with Cataracts, the operation is performed with more difficulty in infancy than at a more advanced time of life: because their eyes are almost always in motion: For this reason, it is adviseable to defer operating upon them till they are come to such an age as admits of their being properly advised on this head. The constant rotatory motion of the globes of the eyes is a proof of their distinguishing light: owing to the luminous rays that pass betwixt the Iris and Cataract to the lateral parts of the Retina: but as an inspection of children's eyes may be made without difficulty the Operator will be enabled to determine with equal judgment at this, as at any other time of life.

When success attends the operations performed on those who are born with Cataracts, we find they learn to distinguish, and know persons and things, by degrees: for, notwithstanding they have already been taught to know and distinguish by the touch, they are nevertheless incapable of doing so with the eyes, till they have
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been for some time accustomed to see and observe.

From the observations of many ingenious men, it appears, that the powers of seeing and distinguishing are gradually acquired.

My own experience convinces me of this fact, from the observations which I have, at different times, made on Patients who were born blind: to some of these I have been happy enough to give a comfortable degree of sight by couching them. In two young people born with confirmed Cataracts, whom I successfully couched at the ages of thirteen and fourteen years; I enquired, by the following experiments, what ideas they had of objects when they began to see: to each of them I gave a watch in one hand; and a key in the other: from use, they had acquired a knack of readily distinguishing one thing from the other, by the touch; as may very easily be conceived of: but when I alternately held before the eyes a watch, and a key; they had no power of discriminating; as was evident from their sometimes calling the watch the key, and the key the watch: at the same time I observed, that they first attempted to feel with the fingers, before they ventured to give any answer to my questions, being conscious of their incapacity.

The youngest person born with Cataracts, I ever couched, was nine years old : the oldest person, I ever couched under similar circumstances, was a young woman of almost sixteen years old.

This young woman, by accident, met a Negro-man in the public street, some few weeks after she had received her sight, and had learnt to distinguish faces. She expressed great surprise at the blackness of the Negro's complexion ; and was rather frightened at, than pleased with, this new object.



OF THE OPERATION OF COUCHING.

THE method which I recommend for performing the operation is this. The Patient being seated upon a firm seat of a convenient height ; immediately behind the Patient is placed an assistant, who supports the head, and inclines it a little forwards, by pressing gently against the back part of the Patient's head, with his breast alone, or by the assistance of a pillow placed betwixt the assistant's breast and the Patient's head : the assistant must, at the same time, carefully lift up the superior eye-lid, and preserve it in this situation by pressing it
against

against the upper part of the Orbit : at the same time, the operator must gently depress the inferior eye-lid with the fore and middle finger of his left-hand, supposing the operation be performed upon the left eye ; with this precaution, that the Globe of the eye be not pressed upwards, or squeezed. Two assistants, one on each side, must secure the Patient's hands. These things being done, the other eye must be covered with a silk handkerchief, or any thing else that is light and pliable : the Patient then is directed to look straight-forwards, or with the eye a little inclined towards the nose : the operator now suddenly penetrates the Globe of the eye with the couching needle (which has first been made warm by dipping the blade of the instrument in hot water) through the Tunica Conjunctiva and Albuginea, at a very small distance beyond the circumference of the Tunica Cornea, and as exactly as possible in a line with the most external part of the circle of the Pupil : the instrument must now be cautiously pushed forwards, till it appears behind the Pupil, which it will always do when the eye remains transparent, and the eye-lids are kept open. The operator now endeavours to press the Cataract gently downwards, and a little outwards, with the flat surface

surface of the instrument; which will sometimes be immediately and happily effected; but, if the Cataract should not readily submit, the needle must be carefully moved underneath the Cataract, and gently raised up; by which means the Cataract may be separated from the Processus Ciliares and Aranea below, and at the same time be disengaged from the inferior portion of the Tunica Iris (supposing it to be slightly connected with that membrane), which cannot always be foreseen. After the Cataract is thus lifted up, the position of the couching needle must be altered, and directed a little above the upper portion of the circle of the Pupil, afterwards inclining the instrument downwards, and obliquely outwards; at the same time taking great care not to wound the Iris, or the Processus Ciliares; because a wound made into the vessels of these parts of the eye will be followed by a discharge of blood, sufficiently great to render the Aqueous Humor opake, and embarrass the operator.—By these means the Cataract will sometimes be so effectually dislodged from the bed of the Vitreous Humor, and its nutrient vessels so perfectly destroyed, as to bring on its gradual decay. In introducing the needle through the coats of the eye, to wit, the Tunica

nica Conjunctiva, Albuginea, Sclerotica, Choroides, and Tunica Retina, it will be right to do it with the flat surfaces of the instrument, looking upwards and downwards; since, by this method, less violence will be done to the coats of the eye, than if the blade of the instrument had penetrated the eye in a transverse direction. When the operation is finished, the Patient's eye-lids must be immediately shut, and covered with a rag, dipped in a solution of Saccharum Saturni or the Pulvis à Cerussa compositus in Rose-water cold, or the Extractum Saturni mixed with brandy, which must be very gently bound on with a soft linen roller. The Patient must be let blood, and kept in a dark place so long as the pain and inflammation remain. After the operation, the Patient ought to sit upright for some hours, as this will be the most favourable posture for preventing the rising of the Cataract. To render the Cataract still the less liable to resume its natural situation, as well as to prevent a fever, the Patient must live abstemiously for some days, and take such food as requires little or no chewing. It now and then happens, that retchings to vomit succeed this operation; but this symptom seldom remains long: when it has proved more than usually

usually stubborn, I have known opiates do great service, when mixed with the salt of wormwood draughts. Fomentations of warm milk, or decoctions of poppy-heads in water, or pearl-barley water, applied to the eye-lids twice or thrice a day, and continued for five or six minutes or longer each time, by the help of a warm sponge, or a bit of fine rag, are necessary so long as any inflammation, pain, or stiffness of the eye, remains. If the eye should continue weak, and be attended with a more than common secretion of the tears, after the inflammation and pain are removed; I have, in such instances, made use of cold spring-water, or damask-rose-water, mixed with a third, or fourth, or fifth part of brandy, Hungary-water, or simple Lavender-water, to advantage: at other times, I have used the Aqua Sapphirina, lowered with common water, or a solution of Saccharum Saturni, or the Pulvis à Cerussâ compositus, in rose-water; or the Extractum Saturni of Goulard, properly diluted in water, and mixed with a little brandy, or Hungary or Lavender-water, with which the eyes have been washed three or four times a day, or oftener; observing, at the same time, not on a sudden to expose the eyes to the light, but to use them

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gradually to it. The length of time necessary for confining the Patient's eyes from the light is quite uncertain: in some there is very little inflammation or pain after the operation; in others there is a great deal of both, attended sometimes with severe head-achs: when these symptoms occur, the Patient must take purges, or lose blood, and sometimes submit to both. If necessary, blisters should be applied behind the ears, or to the nape of the neck, or betwixt the shoulders; which should be kept open as long as may be found adviseable.

In one instance of a boy born with Cataracts, which at two different times I endeavoured to depress, I found them so uniformly soft, that they made no resistance at all to the instrument, and admitted of its passing through and through them, just as it is known to do through the Aqueous Humor of the eye: the boy received no benefit from the operations. This is not that species of Cataract distinguished by the name of the Bag-Cataract, which is of the consistence of cream, is contained loosely in the coat of the Crystalline called by Anatomists the Aranea; which coat, being wounded, evacuates its contents, and diffuses them in the anterior and posterior chamber of the eye, mixing with the Aqueous Humor,

Humor, and rendering the eye turbid ; but it is a species of Cataract *sui generis*, which is sometimes met with, and which, from any peculiar appearance it discovers before the operation is performed, I believe cannot be ascertained. The species of Cataract I have just now described will probably be more frequently met with in young than old people ; as the Crystalline Lens, in its natural state, is known to Anatomists to be more soft in infants than in adults. Since this particular case has occurred to me, I have couched a young lady of thirteen years of age, who was born with Cataracts ; but there was no appearance of this liquid state of the disease. The operation was performed on both eyes, one of which succeeded very well : however, in this case, the Cataracts were more soft, and gave less resistance to the instrument than could be wished ; which sometimes, indeed, happens at the most advanced period of life. In consistence there is a species of Cataract exactly the reverse of that which I have just now described. Its colour is of a deep yellow. In texture it is firm and horny. Upon enquiry, it will generally appear to adhere firmly to a great part of the Iris. This kind of Cataract makes a considerable resistance to the instrument in the

H 2 operation,

operation, and is difficultly depressed, or extracted, on account of the firmness of its adhesion to the Iris on its posterior surface.

The blade of the couching needle should be at least a third part larger than those generally used upon this occasion, as great advantages, I believe, will be found in the depression of the Cataract, by the increased breadth of the blade of that instrument.—The handle of the couching needle, if made somewhat shorter than is usually done, will enable the operator to act with greater steadiness than he can do with a longer-handled instrument.

For this hint I acknowledge myself under obligations to my worthy friend and acquaintance, Mr. Gooch, of Norfolk; whose candor and abilities, in the profession of Surgery, are so great, and whose general character has long been so firmly established, as to be incapable of receiving any advantages from such encomiums, as I am capable of bestowing.



AN ACCOUNT OF THE METHODS USED FOR THE EXTRACTION OF THE CATARACT.

THE manner in which this operation may be performed is as follows.—The Patient being

ing seated upon a large trunk, or box, the operator places himself exactly opposite, upon a seat of a convenient height; and in a room where the light is moderate, that the Pupil may not be too much contracted.

This being done, an assistant stands behind the Patient, who puts his right hand under the Patient's chin; after having covered the right eye, supposing it to be the left which is to be operated upon: the assistant then places the back part of the Patient's head on his breast, at the same time directing the face upwards, to prevent the sudden discharge of the Vitreous Humor. He afterwards, lifts up the superior eye-lid with two or more of his fingers, taking care not to press upon the Globe of the eye above: the operator, at the same time, depresses the inferior eye-lid, with this precaution, not to press upon the inferior part of the Globe of the eye till the incision is made through the Cornea. The Patient must look straight forwards, and a little upwards. The operator now fixes his right elbow upon his right knee; after having put his right foot firmly on the Patient's seat for this purpose. He then suddenly and resolutely introduces the point of his knife through the external part of the Cornea opposite to the centre of

the Pupil, directing it horizontally, betwixt the anterior surface of the Iris and the interior surface of the Cornea, into the fore-chamber of the eye, till it penetrates through the Cornea on its opposite side; when the inferior part of the Cornea must be suddenly divided, by directing the blade of the knife downwards, and outwards. The larger and lower the incision is made, the better will the operation be likely to succeed; and, if it happens that the wound through the Cornea proves too small, it must be enlarged by a pair of sharp scissars, well polished, the blade of which must be curved, so that they may have a convex and concave surface.

The next process of the operation is to wound the Aranea. This ought not to be attempted till a few minutes after the Cornea has been incised: as soon as the incision is made through the Cornea, the eye-lids should be let loose.

By paying a proper attention to these maxims, the whole of the Aqueous Humor will be evacuated from the natural and involuntary motion of the eye; the Iris will become flaccid, and subside upon the Cataract; the Pupil will be dilated, and the instrument for cutting through the Capsula may then readily be directed

rected under the flap of the Cornea to the inferior edge of the Pupil. From these precautions the Pupil will escape violence: to which it is very liable from the passage of the Cataract through it, when contracted and small.—Immediately after the membrane is wounded, the Globe of the eye must be pressed gently upwards, that the Cataract may be squeezed through the Pupil and inferior part of the Cornea, where the incision has been made.—The Cataract being thus removed, the eye-lids must be covered with a soft double or triple rag, dipped in a cold solution of *Saccharum Saturni*, or the *Pulvis à Cerussâ compositus*, prepared in Damask Rose-water, or spring-water; or a solution of the *Extractum Saturni* in cold water; or Rose-water: this application must be kept on with a soft linen-roller, and renewed two or three times a day. The Patient must be laid on his back upon a bed, or couch; and in this situation he must keep himself for some days, that the wound made through the Cornea may heal, and the newly-secreted Aqueous Humor may be prevented from escaping out of the eye.

I look upon the division of the Capsula of the Cataract to be of great consequence in this operation; since this membrane becomes sometimes so tough and thick, as to make a very consider-

able resistance to the pressure of the Globe of the eye; in which case, a great part of the Vitreous Humor is discharged, unless the Capsula of the Cataract be wounded.

It sometimes happens, that the Cataract immediately follows the division of the Cornea, without making any external pressure upon the Globe; owing probably to the sudden and involuntary contraction of the four strait muscles of the Globe, which draw the eye inwards, and forcibly compress it on every side.

This operation, it must be remembered, cannot be properly and safely performed but upon such as have the power of keeping their eyes from rolling about; and therefore, I say, must not be undertaken in those subjects who were born with Cataracts; as their eyes are always in motion; unless the eyes can be kept fixed and steady with the fingers, or with a properly constructed instrument, so contrived as not to press rudely on the eye.

The common Speculum Oculi must not be made use of in this operation, since the compression from that instrument will be found to be so great, as to squeeze out a part of the Vitreous Humor, before the Operator can make the wound sufficiently large through the Cornea, for the expulsion of the Crystalline Humor.

It very often happens that a small part of the Vitreous Humor is discharged in the most successful operation; but I have seldom known it happen otherwise in such cases, than to be soon restored.

The inflammation succeeding this operation is generally considerable; but neither that, nor the operation, often proves to be very painful. It is frequently several weeks after the operation, before the inflammation of the eye is dispersed: which circumstance depends much upon the nature of the constitution.

During this state, the eye should be treated with emollient fomentations and cooling applications, and the Patient's body must be kept open: opiates likewise must occasionally be administered: and if necessary, blood must be taken away once, twice, or oftener. Blisters too are sometimes necessary.

If the Cornea of the right-eye is to be divided, the Operator places himself in the same situation as has been already directed: supposing he has a power of using his left hand to advantage; but if he has not a sufficient command of his left hand, he must stand behind the Patient, and after having lifted up the superior eye-lid he must use his right. The assistant at the same time stands before

before the Patient, and holds down the under eye-lid with the precautions already given.

The proper knife to be made use of in this case is exactly like that which is recommended for the performance of the operation of cutting through the Iris; only that it must be about three times as broad, and about twice as thick, and strong.

The instrument for the purposes of dividing the Capsula of the Cataract, is represented at Fig. 4, in Plate II. and at Fig. 2. This instrument is passed under the Cornea to the Cataract, at its inferior part.

R E M A R K.

IN the two different operations of Couching and of extracting the Cataract, it may be proper to observe, that different parts of the globe of the eye suffer from the different instruments that are used upon these occasions.

In the first mode of operating, the couching-needle is passed through all the coats which are concerned in composing the external, as well as the internal parts of the globe of the eye, except the Cornea and the Iris; to wit, the Tunica Conjunctiva, the Tunica Albuginea, the Tunica Sclerotica, the Tunica Choroides, and the Tunica Retina.

From

From wounding the Tunica Retina, it is probable, those temporary retchings to vomit, and severe pains in the eye and forehead arise; which are sometimes known to succeed this operation.

In the second method of operating (for the extraction of the Cataract) the external parts of the eye that suffer are, the Tunica Cornea, together with the thin covering which this coat receives from the expansion of the Tunica Conjunctiva.

The internal coat that suffers in this operation, is the Aranea, or Capsula of the CrySTALLINE Humor.

The violence done to the Aranea is common to both modes of operating; and is indispensably necessary for the execution of our design of depressing, or of extracting the Cataract: but, when the border of the Pupil is wounded, by the couching-needle being directed too much forwards, or is lacerated, by the Cataract forcing its way suddenly through the Pupil; the consequence proves sometimes so unhappy, as to be incapable of future relief.

For, in some instances, the Pupil becomes totally contracted; and the rays of light are thereby rendered incapable of passing to the Tunica Retina, the Optic Nerve, and the Thalami Nervorum Opticorum: whilst, in other instances, the Pupil suffers only in its size and shape; and
the

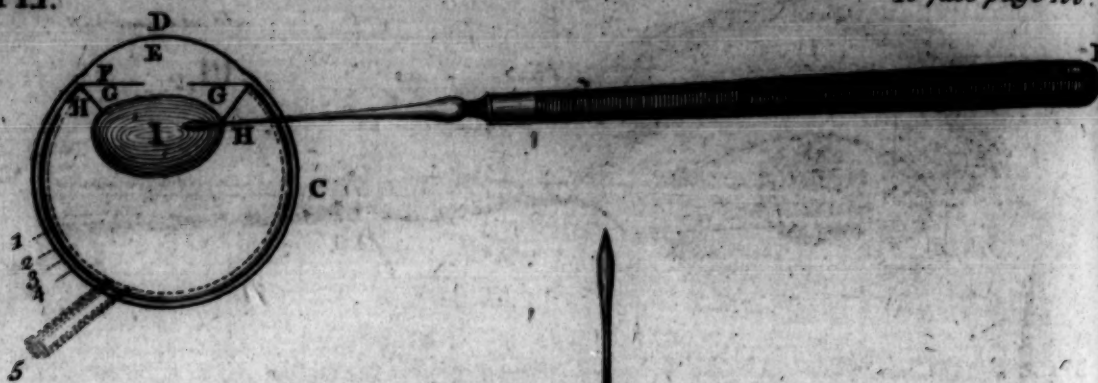
the rays of light are not at all obstructed. No other inconvenience happens from the last cause, but an irregularity in the shape of the Pupil, and an inability of its contracting and dilating so freely, as where the natural form of the Pupil is preserved.

These two accidents I have known to happen unavoidably, from the operation of opening the Cornea, and extracting the Cataract; but never, that I remember, from Couching: unless the Iris has been inadvertently wounded with the needle; which a skilful and steady Operator may always avoid.

The accidents of the greatest importance, which sometimes attend the operation of extracting the Cataract, are, a sinking down of the globe of the eye, a deformity, and an irrecoverable loss of sight; proceeding from too great an evacuation of the Vitreous Humor at the time of operating.

The principal inconvenience of note, attendant upon Couching, is the Cataract's rising again after it has once been depressed; from whence arises the necessity of repeating the operation: though very often with a probable view of success at the second, third, or fourth time of operating.

The



A

- A. The Couching Needle
- B. The Couching Needle passed into the Eye with its Blade lying upon the Cataract.



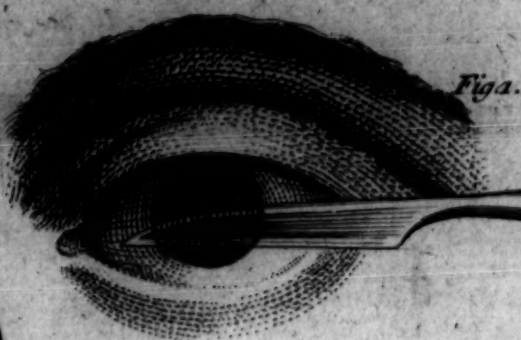


Fig. 1.

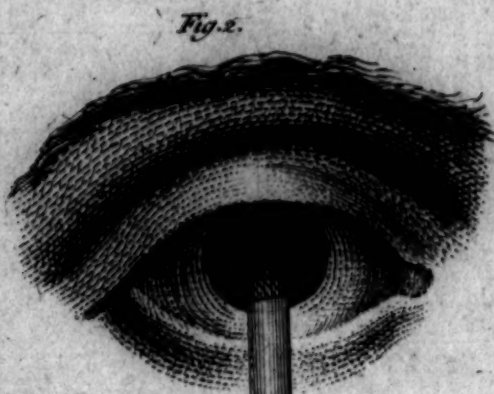


Fig. 2.



Fig. 3.



Fig. 4.

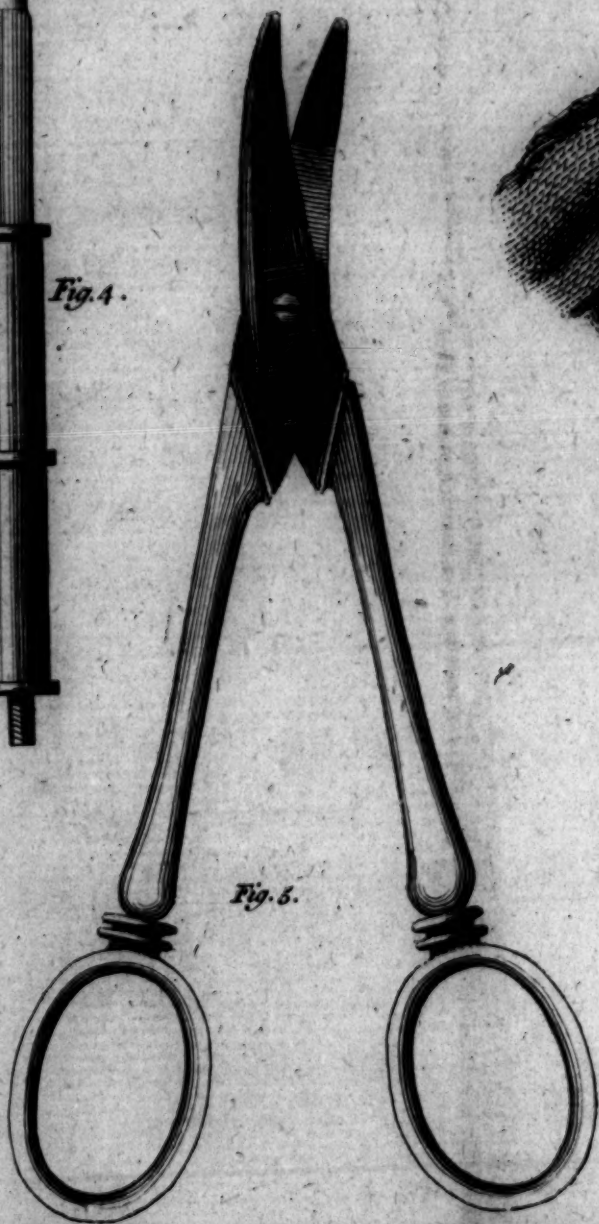


Fig. 5.

Fig. 1. The Eye with the knife passed thro' the Cornea.

Fig. 2. The Eye with the wound on the inferior part of the Cornea, with the Instrument passed under the Cornea and lying upon the Iris for dividing the Aranea.

Fig. 3. The Cataract.

Fig. 4. The Instrument for dividing the Aranea with the point of the Lancet out of its Case.

Fig. 5. The Curved Scissors for enlarging the wound of the Cornea.



The most effectual means of preventing the Cataract's resuming its original situation, after it has once been depressed, is to destroy as effectually as possible the Aranea, by moving the blade of the instrument in different directions; provided the Cataract has not readily submitted to pressure: for, by thus persevering for some time, we shall often meet with success, as experience proves.

There will be very little or no danger of increasing the pain and inflammation, in pursuing these directions; since the violence done to the coats of the eye depends upon the first process of the operation; and not from the subsequent motions of the instrument, after it has once been introduced into the posterior chamber of the eye.

I have often succeeded, by pursuing this method, in Cataracts that would by no means submit to the first, second, or third attempt for depressing them: and therefore I take upon me to recommend this mode of practice as adviseable and necessary in many instances that will be found to occur in the course of business.

T-H-E E-N-D.

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